THE SCHOOL REVIEW

A JOURNAL OF SECONDARY EDUCATION

VOLUME VII
NUMBER 5

MAY, 1899

WHOLE
NUMBER 65

HABITS OF WORK AND METHODS OF STUDY OF HIGH SCHOOL PUPILS IN SOME CITIES IN INDIANA[1]

PART I

In 1881 Dr. Axel Hertel, of Copenhagen, published the results of an examination of 3141 boys and 1211 girls, pupils in the high schools of that city. According to his findings, 31 per cent. of the boys and 39 per cent. of the girls were suffering from some sort of chronic debilitating disease. In the year 1882 these investigations were extended by a royal commission to all the grades of schools, 17,595 boys and 11,646 girls being examined.

Of the whole number of boys examined, 29 per cent. were classed as not well. Upon entering school at the age of five to seven years, nearly 20 per cent. were sick. Sickness increased to 28 per cent. in the second grade and 31 per cent. in the sixth, while in the senior classes of many high schools the rate of sickness reached 64 per cent.

[1] This study was made while the writer was a student of pedagogy in Indiana University and he wishes to acknowledge his indebtedness to Professor John A. Bergström for direction and assistance in its preparation.

The writer also takes pleasure in acknowledging his obligation to the following superintendents, without whose coöperation the material for this study could not have been collected: T. A. Mott, Richmond, Ind.; W. H. Hershman, New Albany, Ind.; Paul Wilkie, Cambridge City, Ind.; S. B. Plaskett, Dublin, Ind.; Chas. E. Clark, Boonville, Ind.; F. D. Churchill, Oakland City, Ind.; Noble Harter, Brookville, Ind.; W. H. Fertich, Bloomington, Ind.

Of the whole number of girls examined, 41 per cent. were found to be suffering from some form of illness. On entering school, 25 per cent. were sick, and, as with the boys, there was a marked rise in the sickness rate, until at ten years of age 43 per cent. of the girls were ill.

The method of carrying out the investigation was as follows: In the higher schools each scholar received a printed form with a list of questions as to name, age, class, number of hours of school work and time spent at home in preparing it; whether the pupil had any help out of school; whether he had any trouble in learning his lessons; the hour of going to bed, number of hours of sleep; health of the pupil (answered by the physician), height and weight (determined at school). In the grade schools every child was examined by physicians.

In 1882 a similar commission made an investigation of the same character in Sweden. The work of Dr. Axel Key, a member of the commission, gives the following results: In the higher schools, 11,277 boys and 3072 girls were examined by the same methods employed in Denmark. Of the boys 44.8 per cent. were found to be sickly, the highest rate of sickness prevailing among the Latin division, 50.2 per cent. Of the whole number of girls examined, there were 65.7 per cent. classed as suffering from more or less serious chronic diseases.

Both commissions report a constant increase in the number of hours of work among high-school pupils of the four grades, a constant decrease in the number of hours of sleep, and a constant increase in the amount of sickness, the rate of sickness being over 60 per cent. among many senior classes.

QUESTIONS SUGGESTED

1. Are the conditions at all similar in the United States?
2. Does sickness prevail increasingly through the grades of our schools?
3. How many hours do our pupils devote each day to school work?
4. In what other work are they engaged?
5. How much time is devoted to other work?
6. What are the habits of our pupils regarding sleep?

Early in the year 1897 the following list of questions was

sent to a number of school superintendents in Indiana with the request that they have their high-school pupils answer them in writing.

1. Give name.
2. Age.
3. Sex.
4. Year in the high school.
5. Number of hours spent each day in study and recitations at school.
6. Number of hours spent each day in doing school work at home.
7. If your time is occupied in any other way—as in music lessons or practice, housework, learning a trade, staying in store, literary work, club work, religious meetings—state what it is and amount of time so spent.
8. Give your regular hours for sleep.
9. How frequently do you vary from these hours? Time lost?
10. Indicate your general health as "good" or "not good."

Papers were received from seven high schools in Indiana. The following will indicate the general character of the answers:

F., 16, first year. Spend five and one half hours in school every day. Spend two hours in study at home. I spend half an hour washing dishes, fifteen minutes sweeping, and fifteen minutes making beds. Sleep from nine to half past five. Vary about once a week, lose an hour and a half. Health good.

F., 18, second year. Spend four hours each day in study and recitation at school. Spend the time from six to half past nine on my lessons. Spend an hour and a half every morning in household work. Hours for sleep, from ten to seven. Vary about once a week. Health good.

F., 17, Junior. Four hours in study and recitation at school, two and a half hours in school work at home. Spend one and a half hours a week in religious duties, two hours a week in club work. Sleep from 9:30 to 6:30. Vary two nights a week, lose five hours a week. Health only fair.

M., 20, Senior. Four hours in study and recitation at school, three hours in school work at home. Three hours in club and home duties. Seven hours for sleep. Vary twice a week, losing four hours a week. Health good,

Six hundred papers were collated. The following table gives the results:

Year	Sex	Age	No.	Study per day	Work per day	Music per day	Sleep	Vary times per week	Loss per week	Health not good
1	M	15⅝	100	6:05	:50	:05	8:33	1	1:20	10%
	F	15⅓	122	7:00	:50	:15	8:45	1	1:10	15%
2	M	16⅜	60	6:00	1:15	:10	8:20	1⅛	2:00	15%
	F	16⅝	85	6:45	1:05	:30	8:35	1¼	1:45	28%
3	M	17⅛	44	6:20	2:00	:05	8:18	1½	3:00	14%
	F	17	95	6:40	1:20	:25	8:30	1⅜	2:40	25%
4	M	18⅛	22	6:20	2:00	:05	7:53	1½	2:30	14%
	F	18⅜	72	6:40	2:25	:25	8:17	1½	3:00	24%

Age of high-school pupils.—Omitting the fractions, the average ages are for first year 15 years, second year 16 years, third year 17 years, fourth year 18 years, indicating that nearly all the pupils had completed a grade each year and that the decrease in numbers for the higher grades is caused by pupils leaving school and not by remaining in a lower grade two or more years, for that would prevent the regular increase of a year in age for each higher grade. The failure of a pupil to reach promotion in the grades often prevents his ever entering high school. Of those completing the eighth grade, it is generally the older ones who do not enter upon high-school work.

The numbers in the several grades.—The numbers given are not to be taken as indicating the relative numbers of boys and girls in the high schools; for reports were not received from all the pupils in the high schools represented in this study. However, there can be no doubt that the number of boys decreases more rapidly than the number of girls as we pass through the high school.

Time spent each day in study and recitation.—The two questions asking the number of hours spent each day in study and recitation at school and the number of hours spent each day in doing school work at home were intended to secure from each pupil a definite statement of the time devoted to actual school work. These questions were readily understood and, in the main, fully

and satisfactorily answered, many pupils stating the time with great particularity.

The number of hours devoted to school work is certainly much less than the time so occupied by pupils of corresponding grades in European countries. However, the writer is not ready to say that it is too little.

The time devoted to school work by the several grades is practically the same, being about six and one half hours per day. The girls are devoting a little more time to study than the boys.

Employment other than school work.—In collating the answers to the seventh question, music was placed to itself and all other kinds of employment, such as tending store, caring for horse, doing house work, etc., were grouped together under the heading "Work."

Of the 600 reporting, 512 have some employment other than school work. The boys mention "passing papers," "staying in store," "learning a trade or profession," "caring for a horse." The girls are employed in household duties, club work, staying in store, etc. Passing papers leads with the boys and household duties with the girls.

The amount of time devoted to outside work increases throughout the high school, the seniors devoting more than two hours a day to employments other than school work. As was to be expected, the girls are devoting more time to music than the boys, the sophomore girls averaging thirty minutes per day. There being eighty-five persons in this group, one devotes three hours per day to music; seven, two hours per day; nineteen, one hour per day; thirteen, one half hour per day.

Sleep.—The eighth and ninth questions were intended to reveal, not only the amount of sleep taken, but also the regularity with which it is taken. Answers are as follows:

I sleep from 10:00 o'clock to 6:30, vary from these hours about twice a week, lose three hours a week. Eight hours for sleep, from 10:00 till 6:00. Vary from these hours three times a week, losing five hours a week. Sleep eight and one half hours, vary twice a week, lose four hours a week. Hours of

sleep are from 10:00 to 6:00, seldom, if ever, vary from this, never lose any sleep.

It is to be noted that the column headed "Sleep" gives the time regularly set apart for sleep and that in order to find the actual amount of sleep it will be necessary to make a slight deduction on account of the loss of sleep for each week.

Both the frequency of variation and the amount of sleep lost increase through the years of the high school, the members of the upper classes going out more frequently of evenings and consequently losing more sleep than the members of the lower classes. This is in line with results obtained by the writer in a somewhat similar investigation a few years ago. In a public school of four hundred pupils, the teachers learned by inquiry on ten successive mornings how many of their pupils had spent the evening before at home. Up to and including the fourth grade there were few who had not remained at home, but from the fifth grade throughout the school the numbers spending the evening away from home constantly increased, the members of the senior class spending more evenings away from home than those of any other class.

Newsholme's *School Hygiene*, p. 92, states the amount of sleep required for school children at:

4	years old,	12	hours.
7	" "	11	"
9	" "	10	"
12–14	" "	9–10	"
14–21	" "	9	"

It would be easy to multiply authorities to the same effect. Pupils in our high schools should sleep nine hours regularly in order to be at their best and do their best work.

Health.—Each pupil was asked to designate his health as *good* or *not good*. In examining the papers, all who made doubtful answers, such as, "My health is tolerably good," "I sometimes have severe headache," "I become tired and nervous," were classed as not well.

For both sexes, the per cents. of sickness are as follows: first year, 12½ per cent.; second, 21½ per cent.; third, 19½ per cent.; fourth, 19 per cent., showing no regular increase

through the years of the course. There is at least the absence of evidence to the effect that the sickness which exists is due to school conditions. Nearly twice as many girls as boys report themselves sick. This difference, if it exists, and it probably does, may be due to the change from childhood to womanhood or to the less active lives of the girls.

It may be of interest to compare the averages for those who are sick with the averages for the whole number.

		Study per day	Work	Music	Sleep	Vary	Loss of sleep
Averages	For whole number.....	6:30	1:28	:15	8:24	1⅓	2:10
	For those not well.....	6:36	1:30	:20	8:20	1½	2:40

The habits of those who are not well differ but little from the habits of those who are well. While this does not justify us in deciding that the ill health reported is not due to school work, any marked difference between the averages for the whole number and for the sick would have been significant.

But a still more interesting comparison is that between the results of these papers written by pupils of Indiana high schools and the conditions found by Dr. Axel Key to exist in the Swedish boys' high schools.

Year	Study per week		Sleep per day		Per cent. not well	
	Indiana	Sweden	Indiana	Sweden	Indiana	Sweden
1	32.5 hr.	61.5 hr.	8:39 hr.	7:42 hr.	12.5%	45.8%
2	32	62.8	8:27	7:24	21.5	42.6
3	32.5	63.4	8:24	7:18	19.5	52.7
4	32.5	64.8	8:05	7:12	19	59

No inquiry was made in the questions sent out concerning study on Saturday. However, several pupils refer to Saturday work, but it is always mentioned as a substitute for work on Friday evening.

Moreover, in the answers concerning employment other than school work it is evident that many pupils have regular duties outside of school work to occupy their time on Saturday. So

that a correction for study done on Saturday or Sunday would not probably greatly change the figures given.

The pupils in the Gymnasia of Copenhagen and Stockholm study six days in the week, the highest classes spending about twice as many hours in school work as our own high-school pupils.

The amount of sleep taken by the members of the several classes in the high schools represented in this study exceeds by almost an hour the amount taken by pupils of corresponding classes in the Swedish Gymnasia.

HEALTH NOT GOOD

On account of the different methods of collecting data, the comparison on this point cannot be made with great confidence. The figures would indicate three times as much sickness among Swedish pupils, as among those represented in this study. That the difference is so great may well be doubted; but that a great difference exists is quite probable; for the conditions which exist in Sweden and which are supposed to cause the alarming amount of sickness found among pupils do not exist here. Our pupils study from one half to three fifths as many hours as the pupils of Sweden, sleep more abundantly than they and may reasonably be believed to enjoy better health.

GENERAL STATEMENTS

1. Our high-school pupils are not doing more school work than is necessary to their proper education and consistent with good health.

2. That high-school pupils should have so many outside interests is questionable.

3. If we are to accept the views of physicians and neurologists, pupils do not sleep enough.

4. It is doubtful whether so large a number of girls can profitably spend so much time on music.

PART II

In April 1898, the following list of questions was sent to a

number of superintendents in Indiana with the request that they have their high-school pupils answer them in writing :

HABITS OF STUDY OF HIGH-SCHOOL PUPILS

Give full name, age and year of the course.

1. What is your best hour in the day for study ?

2. What study can you best work at when you are very tired ?

3. Where can you study best : at school or at home ?

4. Do you prefer to study alone, or with others ?

5. What game or recreation tends most to put you in good condition for study ?

6. What recreation, if any, tends most to interfere with study ?

7. State definitely your method of studying a lesson in history, giving number of times you go over it, time spent in reflecting on it, devices for remembering, etc.

8. State definitely your method of making a translation. Do you complete each sentence in regular order, or do you go over the whole passage repeatedly ? How do you deal with each sentence ? What do you first attack ?

9. State definitely your method of committing a literary selection. Do you go over the whole selection repeatedly, or study it a small part at a time ? How do you get the stanzas in proper order ? Do you study silently, or aloud ? State any devices you have for remembering.

10. How do you discover what to do first in solving a problem ?

11. Do you begin at once, or wait until you have planned the whole solution ?

12. A telegraph wire connecting two offices is supported by six poles 1000 feet apart. The first pole is 1200 feet from the one office, the last pole is 800 feet from the other office. How long is the wire ?

Write down all your work.

The chief purpose of this study was to find out with some degree of particularity the methods pursued by pupils in the actual preparation of lessons from day to day. Every teacher must have observed in a general way the great differences existing among pupils in ability to prepare school work, differences not always accounted for by diversity of talent, if we are to accept other evidences of talent.

Upon entering high school, the work of the pupil is broadened and the assignment is made with less specific direction so that the learner is thrown more upon his own responsibility.

He has not only his task to perform, but, what is often more difficult, he must himself devise a plan for its performance.

Having been for several years connected with high-school work, the writer has had frequent opportunity to observe the "mental fumblings" of first-year pupils in their efforts to adjust themselves to their new tasks. Some accomplished this in a few weeks, others required months or even years. A few failed entirely and gave up school work.

Three hundred and fifty-one papers, each containing about twenty-five statements, were collated. The papers were from three leading high schools in Indiana. The years of the course were represented as follows: First year, 177; second, 47; third, 74; fourth, 53. By an oversight the questions were not given to the second-year pupils of one school; hence the small number of papers from that grade.

The following table shows the preferences of pupils with reference to best hour for study:

	1	2	3	4	Total
Early	43	7	15	19	84
7– 8 A. M.	13	3	8	1	25
8– 9	4	1	4	5	14
9–10	48	17	22	3	90
10–11	24	6	7	2	39
11–12	17	3	2	..	22
2– 3 P. M.	5	2	..	4	11
3– 4	4	2	..	2	8
7– 8	11	..	1	2	14
8– 9	4	..	3	2	9
9–10	1	1	1	4	7
10–11	..	..	..	2	2

The hours preferred above all others are the hour before breakfast and the first hour in school, from 9 to 10 A. M. The proportion preferring an early hour for study is greater in the senior class than in the others. There is a decided preference for the forenoon, 274 preferring the forenoon as against fifty-one preferring the afternoon or evening. Only a few prefer very late hours, and they use such expressions as "the later the better," creating the suspicion that their unusual brightness is due to the so-called "second stage" of fatigue.

STUDIES PREFERRED WHEN VERY TIRED.

	1	2	3	4	Total
Mathematics	57	6	14	7	84
Literature	37	4	23	19	83
Latin	22	6	7	8	43
Botany	25	3	2	..	30
History	..	10	8	10	28
German	12	4	8	..	24
Zoölogy	12	..	..	..	12
Physics	..	..	6	2	8
Drawing	1	4	1	..	6

The following are some of the reasons given for preferences: Literature requires less mental effort, and is, therefore, more easily mastered.—History interests me more, and, therefore, can work best at it.—I become interested in problems, and forget that I am tired.—I take so much interest in literature that it does not seem like work.—The literary work is the easiest for me, consequently I can work at it when too tired to work at any other subject.—Arithmetic gives me something to do.—Because I like it.—Because I am interested in it.—Because, when I study algebra, I forget about being tired.

SHOWING PREFERENCE AS TO PLACE FOR STUDY

	1	2	3	4	Total
At school	52	19	25	11	107
At home	125	25	49	35	234

PREFERENCE AS TO STUDYING ALONE OR WITH OTHERS

	1	2	3	4	Total
Alone	127	37	60	48	272
With others	35	6	13	5	59

Two thirds of the pupils prefer to study at home rather than at school. This is of special interest when considered in connection with the fact that all these papers came from schools in which the discipline is excellent and all the school arrange-

ments such as to make study at school pleasant and effective. It would seem to be an argument in favor of short daily sessions for high schools.

The proportion of those preferring to study alone increases, with but one exception, throughout the years of the course, only five out of fifty-three seniors preferring to study in company with other persons. Nearly all who prefer to study at home, prefer also to study alone; while about half of those who prefer to study at school, prefer also to study with other persons.

GAME OR RECREATION TENDING TO PUT ONE IN GOOD CONDITION FOR STUDY

	1	2	3	4	Total
Walking	59	11	17	11	98
Bicycling	37	9	19	6	71
Driving	16	2	4	4	26
Base Ball	12	5	3	1	21
Music	5	1	4	5	15
Tennis	5	1	2	2	10
Gymnastics	4	2	4	..	10
Running	5	4	..	..	9
Work	4	..	1	1	6

This table indicates that the plebeian practice of walking is still in great favor. Bicycling and carriage-driving come next. Of course, not all have bicycles or carriages. Otherwise the reports would probably differ. A few sturdy young Americans insist that work is good for them, and puts them in excellent condition for study.

TENDING TO INTERFERE WITH STUDY

	1	2	3	4	Total
Reading stories	16	..	10	11	37
Parties	7	2	4	8	21
Violent exercise	..	4	6	3	13
Base ball	7	..	1	..	8
Theater	7	..	1	..	8
Running	4	1	..	..	5
Bicycling	4	1	..	..	5
Dancing	..	..	1	3	4

The reports on this topic are quite meager, many failing to understand the question.

The several subpoints may be grouped under three heads: Reading fiction, social demands, and violent exercise. Grouping in this way we have the following results: Reading fiction, 37; social demands, 33; violent exercise, 31.

The first six questions of the list had reference to the various points which have already been discussed. The rest referred particularly (1) to the method of preparing a lesson in history, (2) to the making of a translation, (3) to committing a literary selection, (4) to solving problems.

METHOD OF STUDYING A HISTORY LESSON

The following answers, taken at random, will give a general notion of the contents of the papers received:

F., 17, fourth year. I read the portion assigned for a lesson, then I take the questions and attempt to answer them. If I fail to answer a certain one I turn to the book and read that part again, usually going over it three times. I have no devices for remembering.

M., 19, fourth year. I commit history to memory, and have no time for reflecting on it.

F., 17, first year. In studying history I form a picture of the place in which the events happened, and that helps me to remember. I read the lesson from two to four times, and then I think it over from two to four times. I can remember best by having a nap.

M., 17, first year. I read the lesson over a number of times, then lay the book down and try to repeat.

F., 16, first year. I read the lesson over to get something of the thought, then read it over again to get it fixed in my mind.

F., 15, first year. I first read the lesson through, then I go over it again and pick out the principal points and think them over until they are firmly fixed in my mind.

M., 15, second year. I learn the connection between the different facts, hunt up definitions of new words, look up all the

allusions, learn to pronounce the proper names, and then read the lesson over four or five times.

F., second year. Read it over and then take each topic and recite it to myself. In this way I can remember it.

F., second year. Read the lesson over twice and then reflect on the most important facts.

F., second year. I make an outline and study it.

M., second year. I read the lesson carefully two or three times, then spend about fifteen minutes reflecting on it, then write down the principal points.

F., 18, fourth year. I go over a history lesson three or four times. Then write it down in order to remember it.

F., 17, fourth year. In studying a history lesson, I read it over two or three times, and then study each paragraph separately until I have the thoughts contained in it fixed in my mind. After I have done this, I form my own questions and try to answer them.

M., 18, fourth year. I first read the lesson carefully twice, then close the book and recall the facts stated.

F., 19, fourth year. I read the lesson twice very carefully, fix in mind the most important events, and then reflect on the lesson while doing other things.

The following is a summary of the principal points suggested by the pupils as being practiced by them in the preparation of their lessons: (1) Repeated readings; (2) selecting important topics; (3) reflecting upon the lesson; (4) reciting to one's self; (5) reciting to pupil; (6) imaging place and events; (7) making a map; (8) writing down the lesson; (9) reading and reflecting on each sentence; (10) remembering one event by another that occurred at the same time or is otherwise related.

The foregoing are, in the main, arranged in the order of frequency with which they are mentioned.

Making a translation. — The following are examples of answers received:

M., 14, first year. I translate each sentence in order and then go over it all to get the thought of the whole passage.

F., 15, first year. I always begin with the first word in a

sentence and go to the last, taking up the words in the order in which they come.

F., 15, first year. I first get the subject and the verb, then the modifiers of each.

M., 16, first year. I write each word as it comes in a column, and after it the definition, then put it all together a sentence at a time.

F., second year. Complete each sentence in order. Find the meaning of the subject and verbs, then fill in their respective modifiers.

F., second year. I glance over it to see what words I do not know, look up the meanings and try to put it together by finding subject and predicates.

M., second year. Go over the whole passage, translating in part, leaving hard sentences and afterward returning to them.

M., third year. Read to a word I do not know, then look it up. After completing lesson in this way I read it over repeatedly to master it well.

F., 18, fourth year. I look over the entire sentence first, then look for subject, predicate and modifiers.

M., fourth year. I look over the first sentence and see whether there are any words I do not know, then I hunt the subject and verb. If it does not make sense, I go on and come back later and try again. The second sentence may be a help in translating the first.

The following statements indicate the habits of the pupils. They are given in the order of frequency with which they are mentioned: (1) Take up words in regular order; (2) find subject and predicate, then the modifiers; (3) first find definitions of all unknown words; (4) translate roughly, then put into good English; (5) find definitions of all words, constructions of all, then make translation; (6) read repeatedly and have benefit of context.

Committing a literary selection. — The examples given will convey a general notion of the results:

M., 16, first year. I take about three or four lines at a time, learn that, then take three or four more, then go over all I have

learned, and keep on in this way until the selection is finished. I remember it by the thought, study aloud, if possible, note what is said first, then second, etc.

M., 16, first year. The page is fixed in my mind so definitely that, in my mind's eye, I can see the type.

F., 15, first year. I first read a selection several times and then take a small portion at a time to commit. I get the stanzas in proper order by the connection of thought. Study silently until I think I know it, then repeat it aloud.

F., 16, third year. I study a small part at a time. After learning the entire selection I repeat it several times to get the stanzas in proper order. Study silently until I think I know it, then write it rapidly. Before attempting to recite at school, I have someone at home hear me.

F., 18, fourth year. I repeat the entire selection, if short. If long, I commit a stanza at a time. I study it aloud and at any time through the day, while I am working, and after I retire at night.

Thirty-five per cent. of those answering this point go over the entire selection repeatedly. Sixty-five per cent. learn it a part at a time and then repeat the entire selection again and again.

Sixty per cent. depend on repeating to get the stanzas or paragraphs fixed in proper order. The rest depend upon the sequence of thought.

Fifty-three per cent. study aloud; the others, silently. However, it is probable that a large majority prefer to study aloud. Some say, "I study silently, but I can remember better when I study aloud."

It is the practice of most teachers of literature to have pupils commit extracts. This work, being done at school, is necessarily done in silence.

The following devices are given as helpful in remembering. They are stated in the order of frequency with which they are mentioned: (1) Giving attention to the rhyme; (2) giving attention to the rhythm, chanting, or singing the selection; (3) writing it down; (4) writing first word in each line; (5) form-

ing imaginary pictures of scenes portrayed; (6) studying selection, then leaving it awhile, and taking it up later; (7) noting the connection of thought.

Pupils use such expressions as, "I murmur the words," "I fit the words to a tune," indicating the helpfulness of some accompanying combination, which is easy to remember.

Solving problems.—The answers to the question how to determine what to do first in solving a problem may be grouped as follows, naming them in the order of frequency with which they occur; (1) Reading the problem; (2) studying it carefully; (3) looking for the unknown quantity; (4) finding what rule it comes under; (5) stating the problem.

The answers to the question: "Do you begin at once or wait until you have planned the whole solution?" are shown in the table below:

	1	2	3	4	Total
Begin	45	22	15	30	112
Plan	98	19	22	13	152

The proportion of those who say they begin at once increases throughout the course.

The purpose of the problem given was to make some test of their practice in regard to visualizing, and its effect upon accuracy. The table shows the number of those who made a diagram and secured a correct answer, and also the number of those who made no diagram and secured a correct result.

	1	2	3	4	Totals	
Diagram	45	15	20	22	102	
Answer	39	13	19	22	93	91 per cent.
No diagram	112	32	30	32	206	
Answer	85	31	28	23	167	81 per cent.

The proportion of those who construct a diagram increases constantly from year to year. The percentage of correct answers is, by 10 per cent., in favor of those who construct a diagram,

Five pupils made very creditable drawings showing the offices, posts and wire, and all obtained correct results.

In addition to the foregoing, 107 individual reports were contributed by university students, teachers and superintendents of public schools, giving results of observations of high-school pupils, together with experiences of the writers when they were themselves in high school.

The following are extracts from these reports:

M., 17, Junior. Would read a portion of the lesson, then walk the floor and think over it, often discussing it aloud. In committing to memory, he would read a portion, then walk while repeating it. Committed very rapidly.

M., 18, Jr. In history work he would always walk around the table and read aloud, then close the book and recite aloud. Would even walk up and down the road saying his lessons aloud. Strong student.

M., 18. Studied best lying on his back; is now a successful lawyer.

M., 17. Drove five miles to school; found a good time to study while on the road with one companion. Ranked highest in school.

M., 17, Jr. Succeeded best in making up a composition while playing on a guitar.

M., 19, Sr. First, the whole selection is gone over hastily, all new words being mastered, but little attention paid to construction. After the story has become somewhat connected, a second reading is given, in which the construction of every word is noted. Student good in both translation and composition.

Positions and movements.— (1) Putting feet up. I can study best when I have my feet up on a table or something of the sort; (2) position of head. He would rest his head on the desk behind him while he studied. He always held his head to one side when in deep thought; (3) lying on his back. Would lie on his back for hours; (4) over a chair. Would lie over a chair on his stomach while studying; (5) walking. Would walk the floor, even the road, talking aloud; (6) gesticulating. While rehearsing history lesson he would gesticulate as in public

speaking; (7) in bed. She would go to bed and study until 10 o'clock, then sleep till 3 o'clock, turn up the lamp and study till 5 o'clock; (8) scratching head. When absorbed in thought would scratch his head energetically; (9) pinching lips. When engaged in study constantly pinched his lips; (10) gazing at ceiling. She would read a passage of history, then close the book, gaze at ceiling and reflect.

Whims and conceits.—Could not study unless the chairs in the room were all in their accustomed places.—Always kept a pencil in his hand while studying.—Was resolved never to read anything more than once.—Imagined a little rack, like a hat-rack, on which he hung topics of the lesson; had a wonderful memory.

Visualizing.—Visualized the text as a whole, could see every line in its place.—Visualized the history lesson dramatically.—Imaged the principal topics and placed the others around them.

The time element in learning.—He would always read the Latin over some time before beginning a translation.—Would make a rough translation and leave it till next day, then review and polish.—Would read history lesson, write out topics. Next day she would review and reflect upon it.—Would repeat very rapidly words in a foreign language.—Could remember better by reading rapidly.

While many depend mainly upon repeating the lesson again and again in regular order, writing it down in set form, diagramming it, etc., various devices for simply retaining in crude form the matter of the lesson with a view to its reproduction in the same form in recitation; there are those who appreciate the importance of the apperceptive mastery of the content of the lesson. They endeavor to seize upon the main topics, relate and compare, and in this way bring the new elements into their own apperceptive combinations.

Taking a general view of the data before us, we may, on the basis of the amount of self-activity and the completeness of apperception, distinguish a regular gradation in methods of study from the simple or mechanical, in which the learner depends upon memorizing by repetition, to the apperceptive in which he endeavors to seize upon the fundamental relation of

things, to understand their significance, and thus brings into play his own self-activity.

The methods of study in history may be classified as follows: (1) The mechanical, indicating least apperception, least self-activity, I read it over until I think I can remember it at recitation. I read it five times. I commit it to memory; (2) the use of devices of various kinds, indicating a higher stage of apperception. I construct a map. I write down principal points. I recite each topic to myself; (3) the apperceptive method, indicating a conscious effort on the part of the pupil to utilize his own knowledge, to employ his own self-activity in mastering the lesson.

The methods employed in making a translation may be classified as follows: (1) The simple method, that of looking up each word in regular order, then combining English words into sentences; (2) the use of some set form, such as the following: find principal sentence, subordinate sentence, subject, predicate, modifiers; (3) a gradual mastery of the passage by successive readings, the parts understood at each reading enabling the pupil to master others, so that he needs only at last to look up definitions of a few words. This method is a process of apperception in which the learner's own knowledge and the facts gained by sight reading, are utilized in interpreting the unknown.

The methods used in committing a selection may be classified as follows: (1) Mere repetition; (2) the use of devices of various kinds some of which tend to a rational mastery of the selection; (3) an attempt to master both the form and the content of the selection by committing the words, constructing the imagery, and noting the connection of thought.

Methods employed in solving problems: (1) Following the rule blindly, the inquiry being as to what rule the problem comes under; (2) the use of devices of various kinds; (3) a distinct effort to solve the problem independently by mastering its relations.

In the foregoing classifications on the basis of the amount of self-activity and the completeness of apperception, the data did not lend themselves easily to mathematical tabulation. However

we may safely arrange the classes in all the groups in the order of frequency as follows: (1) the second method; (2) the first method; (3) the third method.

Are the higher methods of study practicable for all high-school pupils?

Individuals doubtless have their limitations. "Tom Brown" declared that Martin "hadn't the genius" to use his method of study. However, it remains true that only those who become effective, independent students can hope to succeed in educational work. It may be that some pupils learn their lessons in a mechanical way because their attention has never been called to any better method.

The method of assignment has much to do with the preparation of the lesson. A careful organization and logical presentation of the work upon the part of the teacher would doubtless lead pupils to better methods of study.

N. C. JOHNSON

INDIANA UNIVERSITY

THE PEDAGOGIC VALUE OF THE HISTORY OF PHYSICS[1]

"THE education of the child must accord both in mode and arrangement with the education of mankind as considered historically; or, in other words, the genesis of knowledge in the individual must follow the same course as the genesis of knowledge in the race." Such has been the teaching of theorists like Comte and Spencer; such has been the conviction of teachers like Pestalozzi and Froebel. This doctrine is far from self-evident, but *if* it applies to physics, then certainly the history of the science should receive greater attention.

Professor Ostwald of the University of Leipzig, the editor of the *Classics of the Exact Sciences*, emphasizes the importance of the history of science as follows: "While . . . the knowledge of science as it now exists is being imparted successfully, eminent and farsighted men have repeatedly been forced to point out a deficiency which too often attaches to the present scientific education of our younger talent. It is the absence of the historical sense and the want of familiarity with the great researches upon which the edifice of science rests."

Thus great writers on the philosophy of education as well as eminent scientific investigators have, in a general way, pointed out the value of a knowledge of the progress of science. The practical teacher will ask himself the practical question, exactly in what way will a knowledge of the history of physics aid in elementary teaching?

In the first place, *a knowledge of the struggles which original investigators have undergone leads the teacher to a deeper appreciation of the difficulties which pupils encounter.* The difference between mass and weight is a stumbling-block to beginners, and the instructor's patience is often taxed to the utmost. The great originators of mechanics — Galileo, Descartes, Leibnitz, Huygens

[1] Read before the Colorado Science Teachers' Association, May 7, 1898.

—had no clear notion of mass. Weight and mass were taken interchangeably; the two terms meant one and the same thing. That there is a distinction between the two began to dawn upon the minds when it was discovered that the same body may receive different accelerations by gravity on different parts of the earth's surface. When Jean Richer in 1671 went from Paris to Cayenne in French Guiana to make astronomical observations, he found that his pendulum clock, which in Paris kept correct time, fell daily two and one half minutes behind mean solar time. It was shortened, but after his return to Paris it had to be let out again. The distinction between mass and weight was clearly perceived by Newton in his extension of the laws of dynamics to heavenly bodies.[1] On the same spot of the earth mass and weight are proportional to each other. This is not a self-evident fact; Newton proved it in course of a splendid series of tests on the pendulum. He says in his *Principia* (Book II, Prop. XXIV, Cor. 7): "By experiments made with the greatest accuracy I have always found the quantity of matter in bodies to be proportional to their weight."

That the difficulties which students encounter are often real difficulties such as the builders of the science succeeded in overcoming only after prolonged thought and discussion can be exemplified in many ways. Take the laws of motion, the true nature of "centrifugal force," the difference between force and energy, the explanation of the "force of suction," the difference between electric and magnetic phenomena, where is the teacher who, by a knowledge of the struggles undergone by the master minds, will not be impressed by a deeper sympathy with students who encounter "hard points" and are at first unable to master them? More than this, the way original thinkers leveled the barriers often suggests to the teacher good methods for removing those of the pupil. The pendulum at Cayenne was acted upon by forces to a less degree than at Paris, yet its mass was the same in both places; the mass was the same, but the weight was different.

While to the instructor the history of science teaches

[1] MACH, *Science of Mechanics*, transl. by T. J. McCormack, 1893, pp. 161, 251.

patience, *to the pupil it shows the necessity of persistent effort.* Newton began to think of gravitation in 1666, but that coquettish maiden, the law of inverse squares, long eluded him. Jacob waited for Rachel twice seven years; Newton waited for *his* Rachel nearly thrice seven years.

A third lesson to be drawn from historical study is *the necessity of checking speculation and correcting our judgment by continual appeal to the facts, as determined by experiment.* This lesson is as important to the young pupil as it is to the original investigator. Many a young girl first entering the laboratory is afraid of deadly shocks from a harmless Leclanchè cell. Let not the teacher attribute such preconceived notions to stupidity. Able minds have made just such mistakes. The great logician, Aristotle, walking up and down the paths near his school in Athens, came to the conclusion through some involved process of *a priori* reasoning that bodies fall quicker in exact proportion to their weight.[1] If it had only occurred to him to pick up two stones of unequal mass, and then drop them together, he could easily have seen that the one of, say, ten times the mass did not descend ten times faster. The experiment was omitted, and Aristotle never found out his error. Nor did the readers of his books for two thousand years, until finally Galileo ascended the leaning tower of Pisa and dropped iron balls of different weights to show that a light ball will fall with the same velocity as a heavy ball.

Another conspicuous instance of a great man whose judgment was untrained by habitual appeal to the facts was Descartes. When the Copernican theory was under discussion it was claimed by many that, if the earth rotates and bullets are fired vertically upward, they must strike the ground far to the westward. Mersenne and Petit in France tried the experiment. But they were perplexed by an unexpected occurrence. They could not find their bullets at all! Descartes, the great French oracle of the time, was consulted, and he seriously replied that the bullets had received such intense velocity that they lost their weight and flew away from the earth. Such an absurd reply could never have come from experimenters like Galileo or Newton.

[1] *De Coelo*, Book III, chap. 2.

Another point which I desire to make is that *the history of science demonstrates the futility of the pedagogical theory, according to which the pupils in the laboratory should be madé to re-discover the laws of nature.* If ever a teacher undertakes an impossible task, it is he who expects to bring his pupils to the point where they, in eight or nine months, will achieve what Galileo, Gilbert, Boyle, Guericke, Newton, and a host of others, by their united strength, have thought out only after a lifetime given to scientific work. In impracticability this Utopian scheme surpasses all others. Sir Thomas More was outclassed by him who originated this pedagogical theory.

Can we expect our students to discover the law of refraction, *i. e.*, the law that the ratio of *sin i* and *sin r* is constant? To be sure, we may let the student measure the angles of incidence and refraction and he will, perhaps, obtain the following data:

Angle of incidence: 0°, 12°, 20°, 40°, 60°, 70°.

Angle of refraction: 0°, 9°, 15°, 28½°, 41°, 45°.

From the first three pairs, says Dr. Recknagel in the *Zeitschrift f. Math. Unterricht*, the pupil might infer that the index is $\frac{4}{3}$ and is simply the ratio of the angles. But the last three pairs of angles show that the guess is wrong. However, "the right law is soon drawn out by questioning" (herausgefragt). No doubt it can, if *leading questions* are put, but usually in no other way. Let not the teacher be misled into the belief that by leading questions put to his pupils, he has gotten them actually to discover the law for themselves; they have merely taken the hint given them; they have *verified* the law, but not *discovered* it. We are not criticising the mode of procedure pointed out by Dr. Recknagel, but we object to the conclusion that the pupil has been led to make a discovery. History teaches us that four great scientists, whose minds had been richly endowed by nature and trained by years of scientific effort, endeavored to discover the law of refraction and *failed.* Ptolemy, one of the two greatest astronomers of antiquity, Al Hazen, the greatest Arabic physicist, Witelio, a prominent writer of the thirteenth century, and Kepler, the discoverer of "Kepler's Laws," vainly tried to establish the exact mathematical relation between the angles of inci-

dence and of refraction. Can therefore, youths with untrained minds accomplish on the spur of the moment what Ptolemy, Al Hazen, Witelio, and Kepler could not do after years of study? By chance they might, but only by chance. As a rule, the theory that the pupil should be made to re-discover the laws of nature leads either to failure or to deception. With even the brightest and maturest minds, discovery is largely a matter of accident. The history of science clearly proves this. The great Huygens recognized this when he said that a man capable of inventing the telescope by mere thinking and application of geometrical principles, without the concurrence of accident, would have been gifted with superhuman genius. In the schoolroom we cannot *wait* for such accident, though we should try to profit by it, if it does come.

I have pointed out how the history of physics disproves a certain pedagogical theory, how it shows the desirability of holding speculation in check by experimentation, how it emphasizes the necessity of patience on part of the teacher and perseverance on part of the student. I might have spoken of the great liberalizing effect of the view which it affords of the development of the human intellect. But with the practical teacher all these considerations dwindle into insignificance as compared with the aid to be derived from history as a stimulant, as a means of exciting interest. If a teacher creates a living interest in a subject, all other difficulties vanish. Before the introduction of the modern physical laboratory, physics was almost always a subject disliked by students. Even now it is not always popular. The number of students electing laboratory work at the University of Cambridge under James Clerk Maxwell was always small, Ritchie at the London University had comparatively few students. Biot in Paris had often not above half a dozen. Any remedy against such a condition of things must be hailed with joy. Of course, as Rowland says, "Some are born blind to the beauties of the world around them, some have their tastes better developed in other directions, and some have minds incapable of ever understanding the simplest natural phenomenon; but there is also a large class of students who have at least ordinary tastes for

scientific pursuits." Students of the last class may be drawn closer to physics by good laboratory courses and by an acquaintance with the great minds who developed the science.

Of course, historical matter is not to replace laboratory practice, or the discussion of theory; nor do I mean that elementary classes, whose time for the study of physics is already too limited, shall be burdened with a long and systematic course on the history of physics. Introduce historical matter incidentally and skillfully, and you will find it to be the honey which renders the bread and butter more palatable. Where is the student of physics who will not be fascinated by the experiments on air-pressure by Otto von Guericke and the illustrations accompanying the text? Here is a picture of fifty men pulling by ropes and vainly struggling to overcome the atmospheric pressure against one piston. There is an engraving representing eight pairs of horses, four pairs on each side, pulling for all they are worth to separate two huge Magdeburg hemispheres. It is of interest to know that Robert Boyle would probably not have discovered the law bearing his name, except for an absurd criticism made on some of his earlier researches by a would-be physicist. Linus, professor at Lüttich in Netherlands, declared that the air is very insufficient to perform such great matters as the holding up of a mercury column twenty nine inches high; he claimed to have found that the mercury hangs by invisible threads (funiculi) from the upper end of the tube and to have felt them when he closed the upper end of the tube with his finger. This criticism incited Boyle to renewed research and led him to the discovery of his law.

Again, let the student be drawn into the confidence of the historian and laugh with him at the undignified behavior of the Carthusian monks. In Paris a large number of them were formed into a line 900 feet long, "by means of iron wires . . . . between every two," and then Louis XV caused an electric shock from the newly invented Leyden jars to be administered to them. The whole company of austere monks, at the same instant of time, gave a sudden spring, and presented a sight decidedly ludicrous.

Quaint theories and hypotheses, now long forgotten, often

possess peculiar charm. When the pupil has acquired some knowledge of the spectrum, can he fail to be interested in some of the speculations of Newton? How Newton carried on his experiments, not in a public laboratory, but at his chamber in Cambridge; how he introduced light into the darkened room through a small circular hole, passed it through a prism, and then beheld the display of colors on the wall. "Comparing the length of this colored spectrum with its breadth," says Newton, "I found it about five times greater; a disproportion so extravagant that it excited me to a more than ordinary curiosity of examining from whence it might proceed."[1]

Newton showed that this phenomenon was due to the fact that some rays are more refrangible than others, but before he hit upon the right explanation he advanced several hypotheses, only to find that each was disproved by the facts. One of these guesses is of particular interest, as it shows that Newton's profound mind had dwelt upon a subject prominent in modern athletics, namely, the subject of "curved pitching." Surely the modern student would find it hard to guess what possible relation might be supposed to exist between the performance of a twirler on the diamond and optical theories. Newton said, "Then I began to suspect whether the rays, after their trajection through the prism, did not move in curve lines, and, according to their more or less curvity, tend to divers parts of the wall, and it increased my suspicion when I remembered that I had often seen a tennis ball, struck with an oblique racket, describe such a curve line." Newton's idea was that the little particles supposed to constitute light received a circular motion in passing through the prism, and, meeting resistance in the ether, would curve around during their passage from the prism to the wall. Some particles receive a greater rotation and curve around more than others. Those bending around farthest constitute the violet rays; those deviated least make up the red rays.

Will students be interested in details of this sort? So far as I know, the testimony of teachers who have tried it is unanimous. The pupil begins to feel that he has a personal acquaint-

[1] *Phil. Trans.* Abr., Vol. I. p. 128.

ance with the great men of science. He is charmed with reminiscences about them, with their hopes, struggles, disappointments. They appear to him no longer as irresistible, superhuman heroes, but as human beings, liable to perplexity and failure. During this historical reading the pupil unconsciously acquires a greater mastery of the subject itself. Not infrequently the enthusiasm of the investigator is transmitted to the pupil.

Plutarch tells us that Archimedes was continually accompanied by an invisible siren whose bewitching music caused him to forget the troublesome affairs of life, and inspired him for the study of great themes and the discovery of truth. These same siren melodies have charmed Galileo, Newton, Fresnel, Helmholtz. Let our pupils get closer to these master-minds, and they, too, though only feebly, perhaps, may be brought under the enchanting spell.

FLORIAN CAJORI

COLORADO COLLEGE,
Colorado Springs

SECONDARY EDUCATION IN THE UNITED STATES[1]

AN HISTORICAL SKETCH[2]

THE early history of the High School for Girls in Boston is full of interest. The movement in the School Committee for the establishment of such a school began in May, 1825, when the Rev. John Pierpont proposed the appointment of a special committee "to consider the expediency and practicability of establishing a public school for the instruction of girls in the higher departments of science and literature." At that time, as for the thirty-five preceding years, girls were allowed to attend the grammar schools of Boston for six months in the year, from April to October. The committee appointed under the Pierpont resolution brought in a favorable report, which may be summarized as follows:

> In the first place [so reads the report], in regard to the *general* expediency of placing women, in respect to education, upon ground, if not equal, at least bearing a near and an honorable relation, to that of men, in any community, your committee think that no doubt can, at this day, be entertained by those who consider the weight of female influence in society, in every stage of moral and intellectual advancement; and especially by those who consider the paramount and abiding influence of mothers upon every successive generation of men, during the earliest years of their life, and those years in which so much, or so little, is done, towards forming moral character, and giving the mind a direction and an impulse towards usefulness and happiness in after life. As to the *general* expediency, then, of giving women such an education as shall make them fit wives for well-educated men, and enable them to exert a salutary influence upon the rising generation, as there can be no doubts, your committee will use no arguments at this board; but will confine themselves to the *particular* expediency of provision for a higher education of our daughters, at the public expense.

The particular arguments for the establishment of the school are:

First, that it would afford a needed stimulus to the brighter

[1] Copyright, 1897, by Elmer E. Brown.

[2] Continued from February number, 1899.

pupils in the grammar schools, who under the conditions then existing were "in constant danger of falling into habits of inattention, and mental dissipation."

Secondly, it would furnish to the city a supply of competent teachers for the primary schools.

Thirdly, it would present a favorable opportunity of trying the monitorial system of instruction, which, if successful in this school, might thereafter be introduced into the grammar schools.

With reference to the studies to be pursued, the committee proposes "that some be *required* and others only *permitted*, as tokens of merit and incitements to industry."

Finally, with reference to the expense involved in the experiment, the committee urges the view that good schools are in the long run economical.

When liberally supported, they more than support themselves. They are a source, not of honor only, but of pecuniary profit, to the city; for, taking into view — as an enlightened policy does take into view — the whole period during which these institutions exert their influence upon the community, they more than indemnify the city for the expense of their maintenance, in that the knowledge they diffuse through the great mass of the population throws open new and wider fields to enterprise, gives higher aims to ingenuity, and supplies more profitable objects to industry.

The City Council was asked to appropriate two thousand dollars for the school, which was done "with great unanimity"[1] on the 25th of September, 1825. In October, the School Committee adopted the report of a sub-committee on the organization and standing of the school proposed. The following are the proposals of this report with reference to the admission of pupils and the course of study:

Your committee would propose that the candidates for admission to this school shall be *eleven*, and not more than *fifteen* years of age; allowance, in particular cases, to be made according to the discretion of the School Committee; that they shall be admitted on examination in those studies, which are pursued in the public Grammar Schools of this city; and that the examination may be strict or otherwise, as the number of candidates shall hold relation to the accommodations provided for them:

[1] QUINCY, *op. cit.*, p. 217.

That the *course of studies* in this, as in the English High School, shall be calculated to occupy *three years*:—

That, in pursuance of the suggestion of the original report on this subject, some studies shall be *required* of all the scholars, and others *allowed* as evidences of honorable proficiency, and as motives to higher efforts; and that the following be the studies of the school, acccording to the order in which they shall be pursued, until otherwise ordered by the School Committee.

FIRST YEAR

Required: No. 1. Reading—2. Spelling—3. Writing words and sentences from dictation—4. English grammar, with exercises in the same—5. Composition—6. Modern and ancient geography—7. Intellectual and written arithmetic—8. Rhetoric—9. History of the United States.

Allowed: Logic, or botany.

SECOND YEAR

Required: Nos. 1, 2, 5, 6, 7, 8, continued—10. Bookkeeping by single entry—11. Elements of geometry—12. Natural philosophy—13. General history—14. History of England—15. Paley's Natural Theology.

Allowed: Logic, botany, demonstrative geometry, algebra, Latin or French.

THIRD YEAR

Required: Nos. 1, 5, 12, 15, continued—16. Astronomy—17. Treatise on the globes—18. Chemistry—19. History of Greece—20. History of Rome—21. Paley's Moral Philosophy—22. Paley's Evidences of Christianity.

Allowed: Logic, algebra, principles of perspective, projection of maps, botany, Latin, or French.

On the 13th of January, 1826, the school was formally established by the School Committee. The success of the English High School for boys had greatly encouraged the promoters of a similar school for girls. Some doubts were expressed, however. There were conditions likely to affect a school for girls which did not obtain in the case of a similar school for boys. The number of applicants for admission to the High School for boys had not exceeded ninety in any one year. The whole number of pupils in that school at this time was only 146. The fear that a much larger number would apply for admission to the High School for girls led cautious men to prophecy disaster; and the new school "was adopted expressly 'as an experiment;'

'if favorable, to be continued, if adverse, to be dropped of course.' "[1]

Instead of *ninety* candidates,—the highest number that had ever offered in one year for the school for boys,—it was ascertained that nearly *three hundred* would be presented for the High School for Girls. The spacious room provided for the school would not accommodate more than *one hundred and twenty;* and it was evident that, either *two high schools for girls must be established the first year*, or that more than one half of the candidates must be rejected, to the great disappointment of their parents and instructors.

In this dilemma, a special meeting of the School Committee was called, on the twenty-first of February, the day previous to that appointed for the examination; and, after much deliberation on the course to be pursued, they resolved to keep the number to be admitted under their own control; and for this purpose passed a vote, that the Sub-Committee, appointed, as examiners, should report to the School Committee, "*the names, ages, and standing of all the candidates they should find qualified for admission*, that THIS COMMITTEE MAY DETERMINE WHAT CLASSES OF THEM SHALL BE ADMITTED."[2]

The examination of applicants for admission was held on Washington's Birthday, and 286 candidates presented themselves. In the face of much complaint, the plan adopted by the School Committee was carried out. The number was reduced by a process of elimination, based on the credits received by the several applicants in the examination. In this way 130 girls were admitted and the school was opened on the 27th of February, with Ebenezer Bailey in charge.

The school was highly successful from the start in furthering all of the ends for which it was established. It was visited "almost daily" by gentlemen who came from different and distant parts of the country for the purpose of examining into the methods of education pursued in Boston.

In August, 1826, a report was presented to the School Committee, asking for the continued support and enlargement of the school, and presenting the following information: "That the present number of the school was one hundred and thirty; that few, if any, could be excluded the present year; that, according

[1] QUINCY, *op. cit.*, p. 217.

[2] *Idem.*, p. 218.

to the best calculations that could be made, the number of the candidates for admission at the then next ensuing examination, would be four hundred and twenty-seven, who, if they were all admitted, and those now in the school retained, it would be necessary that five hundred and fifty-seven members of it should be provided for."[1]

The School Committee could not face with equanimity this tremendous increase in the school, together with the increased financial burden which it would entail. Accordingly a change was adopted on the 17th of November, 1826, in accordance with which the age of admission was raised from eleven to fourteen; the requirement for admission was raised so as to include all branches taught in the public grammar schools; the time which a pupil might continue in the school was reduced from three years to one; and no girl might be admitted after the age of sixteen. On this basis the school was continued for a second year.

But these changes did not offer a satisfactory solution of the problem. In December, 1827, the School Committee was equally divided on the question of the expediency of continuing the school. The question was accordingly left over for settlement by the new School Committee then about to be elected. Mayor Quincy, then re-elected for his sixth term, in his inaugural address before the City Council, in January, 1828, took a position distinctly unfavorable to the school as then constituted.

> Every school [he declared], the admission to which is predicated upon the principles of requiring higher attainments, at a specified age or period of life, than the mass of children in the ordinary course of school instruction at that age or period can attain, is in fact a school for the benefit of the few, and not for the benefit of the many. Parents, who, having been highly educated themselves are, therefore, capable of forcing the education of their own children; parents, whose pecuniary ability enables them to educate their children at private schools, or who by domestic instruction are able to aid their advancement in the public schools, will for the most part enjoy the whole privilege. In form it may be general, but it will be in fact exclusive. The sound principle upon this subject seems to be, that the standard of public education should be raised to the greatest desirable and practicable

[1] *Idem.*, p. 219.

height; but that it should be effected by raising the standard of our common schools.[1]

On the twelfth of February, 1828, a sub-committee, of which the Mayor was chairman, presented to the School Committee an extended report, prepared by Mr. Quincy, in which the difficulties in the way of a continuance of the school were set forth in detail. It was estimated that if the school were to be continued on the basis which was at first proposed, "provision must be made for, from eight to twelve hundred scholars, in the first three years; at an expense of two High School-houses with suitable preparations, which would cost not less than fifty thousand dollars; and upon the supposition of the same ratio of masters and ushers to scholars (one to one hundred) and only the same rate of salaries as in our present Grammar schools, causing an additional expense of ten thousand eight hundred dollars annually; with a certainty that the numbers and expense must annually increase."[2]

Such an outlay for the higher education of girls was of course out of the question. As Mr. Quincy remarked in his address to the Board of Aldermen on taking final leave of the office of Mayor: "No funds of any city could endure the expense."[3]

This sub-committee proposed various changes, which were adopted by the School Committee. These were:

1. The introduction of the Monitorial system into all our public Grammar and Writing schools, as soon as it is practicable.

2. The elevating and enlarging the standard of public education, in all our Grammar and Writing schools, so as to embrace the branches taught recently in our High School for girls.

[1] *Op. cit.*, pp. 409, 410. See also *Idem*, p. 271. It is evident that the term "common schools" was held by Mr. Quincy to denote schools of lower grade than the high school. In a communication to the School Committee in 1826, recommending that a knowledge of all the studies taught in the grammar and writing schools be required for admission to the High School, Mr. Quincy had said, "by an adherence to this system, it cannot be doubted that the High School will, in one or two years, become what it ought to be, a school for the instruction in those parts of science to which the common schools are from their constitutions inadequate, and for which they were not intended."

[2] *Am. Journ. Ed.*, Vol. XIII, p. 249.

[3] *Municipal history of Boston*, p. 270.

To this object two things are plainly essential. 1. The introduction, as is proposed, of the monitorial system into the Grammar and Writing schools, because the High School for girls was instituted, conducted, and its studies arranged with reference to that system. 2. Removing the present fourth class from our Grammar and Writing schools: for unless this be done, it is impossible to introduce the elevated and enlarged course of studies proposed. 3. Introducing the monitorial system also into our Primary Schools, and thus effecting the requisite modification of those Schools. [1]

On the third of June, the School Committee voted "that the girls be permitted to remain in the English Grammar Schools throughout the year." Accordingly, "the project of the High School for Girls was abandoned, and the scale of instruction in the Common Schools in the city was gradually elevated and enlarged." [2]

Mr. Bailey [3] had resigned the mastership of the school in November, 1827, and had opened a private school for girls. The report of this sub-committee upon the failure of the High School for Girls called forth from him an indignant review. The mayor was charged with having been hostile to the school from the start and having sought by indirection to injure and cripple it. The pride of Bostonians in their schools was remarked, and their willingness to give them liberal support. The opinion that too much money was expended on the public schools, and that they should be merely eleemosynary institutions, had been heard from more than one member of the City Government, but from no one else. The mayor's high opinion of the monitorial schools of New York received unfavorable comment. Mr. Bailey had himself employed the monitorial system (and effectively, it would seem); but he declared that "I have no faith in the system which delegates the *authority* of the master to mere children, and *substitutes* the instruction and discipline of monitors for *his* personal services."

The implication in the sub-committee's report that the school

[1] *Am. Journ. Ed.*, p. 251.

[2] *Quincy, op. cit.*, p. 225.

[3] Ebenezer Bailey was one of the founders of the American Institute of Instruction, a man of excellent abilities and winning personality, a highly successful teacher and a writer of recognized ability. An account of his life may be found in the twelfth volume of the *American Journal of Education*.

had failed, because it had been found impossible to bear the expense which the plan entailed, met with a vigorous protest from Mr. Bailey.

> Grant that the High School for Girls was but an "experiment," [he says], it will not be denied that it was a very important one. It was the *first* institution of the kind; and as such, not only excited a lively interest in our own community and country, but even in England, and on the Continent, the establishment of this school was honorably noticed in the public journals. It is highly important, therefore, to the general interests of female education, that the true result of this "experiment" should be known. If it were indeed a "failure,"—that is, if our own experience has made it certain that it is either inexpedient or impracticable to extend to females a liberal course of education,—it should warn others not to make the attempt. But if the "failure" proceeded from other causes, it should be exposed, that the great cause of female education may suffer no detriment."

He proceeds to show that the three specific ends for which the school was originally established had been accomplished "beyond the most sanguine expectations of those who had first proposed it." Even the masters of the grammar schools, who might have been expected to oppose it, were for the most part favorable to it. The mayor's dictum that a school organized with such requirements as to the age and scholarship of pupils admitted, was a school for the few and not for the many, was met by the assertion that the age requirement was merely incidental and arbitrary—that scholarship alone should be required for admission to the higher school. Finally, a bill of complaints was presented against the mayor on the ground that he had subjected the school to petty hindrances, annoyances, and neglect, the nature of which may be illustrated by the remark that, "The only written communication from the board with which I was honored for more than a year, was a letter from the mayor, reprimanding me 'in good set terms,' because the young ladies, of their own free will, and motion, had agreed among themselves to wear black silk aprons at the exhibition!"

Mr. Bailey's review would seem to have expressed not only his individual feeling on the subject, but a sentiment freely shared and expressed by many citizens.

In his farewell address to the Board of Aldermen, Mayor

Quincy made a brief but spirited reply to the criticisms which had been passed upon him in this matter.

The High School for Girls was effectually disposed of; and so great was the influence of Boston in matters of public education, that this outcome undoubtedly affected unfavorably the whole movement in this country for the higher education of girls at municipal expense.

It was not until 1852 that efforts toward the repetition of the "experiment" in Boston met with any substantial encouragement. Nathan Bishop, the first Superintendent of Public Schools for the city, had recommended in his first annual report, issued at the end of the preceding year, that a Normal School be established as a part of the Boston system of public instruction. This suggestion having been approved by the School Committee, the City government on the 8th of July authorized the establishment of such a school. It was accordingly opened in the fall of 1852. Two years later, in response to the continued urgency of the friends of the more general education of girls, the Normal School was converted into a High School for Girls, in which a normal class was formed.

VITTORINO DA FELTRE[1]

ALTHOUGH the humanistic movement took its rise in Italy, and is associated in its early stages with such great names as those of Dante, Petrarch, and Boccaccio, this fact has not been very much impressed upon students of education in the western world. The typical humanist is probably more generally found in Johann Sturm in his gymnasium at Strassburg than anywhere else, doubtless because by far the larger part of our material for the history of education has come to us from German sources. It will be news to many that early in the sixteenth century there flourished in a small Italian city one of the most interesting, suggestive and successful schools of which we have any record, the presiding genius of which may fairly be counted, by any proper measure, as one of the greatest schoolmasters of any age or any people. This school was the Mantuan school, nobly presided over by Vittorino Da Feltre. Mr. Woodward has given us, so far as I am aware, the first fair account of this institution and its master to be found in English.

Vittorino wrote no books himself, but he did write himself large in the character of his pupils and disciples, a number of whom have passed down the traditions and practices of his school in literary works that bear all the imprints of most affectionate regard for their great teacher. There are some Italian authorities and several Latin treatises. Buisson, in his *Dictionnaire de pédagogie*, has an excellent article on Vittorino by Enrico Paglia, who was in 1884, at the time the article was written, director of the municipal schools of Mantua. Mr. Woodward's book is a scholarly production, admirably written, which gives a lifelike picture of a great teacher, a description of his school and his methods of high pedagogical value, and, incidentally, throws a vast amount of light upon an exceedingly interesting period in the history of education.

[1] *Vittorino Da Feltre and Other Humanist Educator* by WILLIAM HARRISON WOODWARD, University Press, Cambridge.

Vittorino was the son of poor but noble parents by the name of Rambaldoni. He was born in the little town of Feltre, in 1378 or 1379. The boy was small though vigorous, and to his slight size he was said to owe his diminutive name, Vittorino. Later he was ealled Da Feltre, from the town of his birth. His childhood was passed amid many necessities and few advantages. At an early age he left home to study at the University of Padua, where he was obliged to earn his living as best he could while carrying on his university work. He soon made himself a name as an able grammar teacher, and earned some money in monotonous, laborious private tutoring. After studying arts and philosophy, he turned to mathematics, where, though already holding the doctor's degree, he found himself so poor that, unable to pay the charges of the class conducted by the famous Professor Pelecani, he acted as a household drudge in his master's family for a period of six months. For twenty years we find him located at Padua, in one position or another, gradually rising to the position of one of the most honored professors in the university. He found himself greatly troubled by the looseness of conduct and laxity in living on the part of the students, and from this experience derived his lifelong conviction that the critical period of youth demands, first of all, close, watchful care, and that this can scarcely be secured among the distractions of a university city.

While still professor at Padua, moved no doubt by this feeling, we find him receiving into his own house a number of students who boarded with him. This was at that time a rather common practice among the regents of most universities, and was regarded, ordinarily, merely as a profitable means of livelihood, but to Vittorino it presented itself as a responsibility. He firmly refused, always, to increase the number of his pupils beyond a limit which made it possible for him so exercise a direct personal supervision and gain an intimate knowledge of the character and capacity of each student. He had no hesitation in dismissing any who had proved unsatisfactory in morals, or, though with more reluctance, any who were slow of intellect or disappointed their early promise.

About 1422, in consequence of his sorrow at the prevailing disorder among the students at Padua, and his inability to check it, he resigned his chair and went again to Venice, where he had previously spent a short period in the study of Greek. Here he founded a private school for the sons of Venetian patricians and others, and rapidly became recognized as the most trustworthy and capable teacher of the new learning in Italy. Here he had just become comfortably settled when he received an invitation from Gianfrancesco Gonzaga, in Mantua, to take charge of the education of his children. Gonzaga was a very good sort of man for those times. He wished to secure the best teacher in Italy for his children, and made Vittorino a very liberal proposition, leaving him free, indeed, to fix his own stipend. Vittorino accepted the post, it is said, in the following terms: "I accept the post on this understanding only, that you (*i. e.*, the Marquis Gonzaga) require of me nothing that shall be in any way unworthy of either of us, and I will continue to serve you so long as your own life shall command respect." The arrangement thus made proved in all ways a fortunate one. A beautiful building, formerly used as a pleasure palace, was given up to the purpose of the school. The children of Gonzaga constituted Vittorino's immediate charge. With them Vittorino was empowered to associate, as fellow-pupils, a certain number of the sons of the leading Mantuan families. He later added a department for promising pupils that were selected without regard to the rank of their families, fees being proportionate to the means of the patron, or, it would seem, in some cases, altogether remitted. The pupils who paid nothing were received on absolutely the same footing as the rest of the boys; in some cases he undertook the entire cost of their maintenance, including clothing and books, for ten years or more. The greatest scholars of the times sent their sons to Mantua. The Mantuan school rapidly became the recognized *gymnasio* for the aristocratic youth of northern Italy.

The sumptuous palace placed at his disposal for a school was ruthlessly stripped of all its luxurious furnishings, ornaments, and plate, in order that the children might lead as simple a life

as possible. Certain companions whose influence upon the Gonzaga children he distrusted he weeded out as delicately as possible. Vittorino definitely held himself the father of his scholars; his school entirely absorbed him. He lived a common life with his scholars, at their meals, in the games, and excursions, always sharing their interests and pleasures. Such was his control over the boys under his charge that harsh punishments were not needed. He watched carefully over habits of self-indulgence in eating and drinking, and considered regular exercise in all conditions of weather as the foundation of health, and health as the first necessity of mental progress. He aimed at sending forth young men who should "serve God in the church and the state in whatever positions they might be called upon to occupy."

The detailed curriculum of the school, including the texts read and the methods followed, as given quite exhaustively by Mr. Woodward, will be read by teachers not only with pleasure, but with direct personal profit, for Vittorino was a great teacher. He anticipated in a marvelous way some of the best methods that we suppose to be thoroughly modern, and joined in himself the characteristics of many of our typical best teachers. A brief summary of his method is all that can here be given. Vittorino was a Platonist, and held that the souls of men are like seeds of divine nature and origin, planted in the body, there to germinate in the soil where, according to its original composition and fertility procured artificially by culture, they might be modified in their development, and reveal the innate faculties that they had within them the better in that they should be less hindred by the materiality of the body. The unique aim of education in general, and that of the child in particular, for him, was to correct the body, which was by nature defective and opposed to the soul, and to give to immortal souls that liberty which was taken from them by union with mortal bodies; in short, to obtain, according to the formula *mens sana in corpore sano*, the perfect man. Imitation gives the impulse to all this evolution. The foundation of every pedagogical device is the example of the teacher. Therefore, before instructing others, Vittorino wished himself to be healthy, agile, strong, with good manners, sober,

virtuous, learned in many branches of knowledge, an intellectual and spiritual man.

His first preoccupation was the study of the nature of the pupil and his family history, in order to discover the influences of heredity and of avatism, and to choose the sort of activity upon which it would be better to lay emphasis in his exercise and studies. Instruction was of the most varied kind. He offered the pupils many studies at the same time, for, he said, as the body is restored by the variety of its food, so are souls by alternation of materials of study. He believed in the synthesis of knowledge. The school embraced pupils of all ages. He taught reading and writing by means of games and picture tablets of various colors, thus following the example of Quintillian and, perhaps, anticipating Froebel. Next he offered the children Virgil, Homer, Cicero, and Demosthenes, and when they had been fed upon these as upon pure and unadulterated milk, and their stomachs had acquired in this way strength and vigor, he thought they might safely take up the historians and the other poets, more difficult food to assimilate. Then they were taught rhetoric and dialectic; next arithmetic, geometry, astrology, music. Last of all he introduced them to the truth of philosophy in the princes of that domain, Plato and Aristotle. No one could leave his school without having attentively gone through all the philosophy taught by those masters.

Vittorino in his attitude towards his pupils, his fatherly affection for them, his habit of living among them, and in many other facts, suggests Pestalozzi; and, indeed, the latter was himself attracted toward Vittorino, and seems to have known of his work, although Pestalozzi concerned himself, in general, but little with the history of the Renaissance.

For a great part of his life Vittorino thought that he was destined for the monk's calling, and yet in his attitude to physical culture he broke entirely with the traditions and practices of the monkish schools of the Middle Ages and of his own time, and set a standard which has perhaps not anywhere been equaled to this day, except in some of the best schools of England and the United States. He recognized the individuality of each

student, studying first of all what that might be, and so anticipated the movement which is just now gaining ground in this country under the title of Child-study in the secondary schools. He was a man of the most eminent scholarship, and yet entered with enthusiasm and complete surrender into the practical and even the so-called petty details of school life, for to him no task was so attractive, so noble, so satisfying, as that of training the perfect man. All accounts left of him show him to have been a man of singularly sweet and elevated character. Among his pupils were numbered some of the greatest scholars of the period of the Renaissance. Moreover, the children of his noble patron, who grew up under his influence and training, did a surprising thing: with not a single exception, they "turned out well." They represented the best culture and, in most respects, the best living of their time. There seems scarcely a doubt that if the Mantuan school were running today it would rank high among modern educational institutions. That it was a great school, and that Vittorino was a great teacher there is no possible doubt, and the record of his life and work is an inspiring and interesting study for teachers today.

CHARLES H. THURBER

EQUIPMENT AND ADMINISTRATION OF THE HIGH-SCHOOL BOTANICAL LABORATORY

HAPPILY in all the schools of the state, the laboratory sciences are now recognized as a part of every course of study. You will recall that only four or five years ago we were engaged in apologies and arguments for maintaining these studies as laboratory studies. The past four years have seen wonderful progress in laboratory equipment; and now we can turn our attention from arguments for being, to the work of determining the best in subject-matter and in method. Our task is, therefore, unpretentious; but it is hoped that the details presented may not prove wearisome.

There are two reasons that give the speaker a measure of confidence in appearing before you in discussion of this topic. One is his desire to define with some precision the university requirement for admission botany; the other is his desire to offer a helpful criticism to some pernicious methods used in teaching botany, his knowledge of these methods having been gained by his inspections of more than a dozen of our diploma schools during the past few years, and from the papers presented by those taking the examination for admission to the university.

Before we can ascertain the proper equipment and management of the laboratory, we must revert to the aim of the study. Permit me, therefore, to repeat here, that, to my mind, the aim of a biological study is threefold:

1. To train the pupil to see.
2. To train in the use of descriptive language.
3. To enable the pupil by stimulating inductive reasoning to gain some notion of natural relations, including his own relations to nature's creatures and nature's laws, including, also, his relations to his fellow men.

While the first two aims are common to all laboratory science, and are secondary, the third is preëminently, though not solely, the function of biological study.

If, now, we have clearly in mind the aim of the study, accuracy of observation, of description, and the perception of natural laws, we may inquire what the subject-matter should be in order to fulfill this aim.

Obviously the matter used and the course pursued will depend very largely upon the kind of training received by the teacher. Whatever his training, his horizon for the perception of the relations in nature must be wide, and his vision clear; else he cannot direct the gaze of the pupil. To gain this breadth of view requires the lapse of time spent in training. How much time?

Not everyone is called; but I believe a minimum of two years of college training — a full course for four semesters — is necessary for all except the genius. The botanical department of the University of Michigan does not recommend those for teaching botany who have not had at least two years of botanical training in college. With such an amount of preparation there must be united a considerable degree of individual originality and progressiveness, in order that the teacher may adapt the work, meet new conditions, and feed his enthusiasm with new acquisitions.

We may assume that, in this part of the country, all teachers of botany in the high school have had their training along one or more of three lines of study. These are: (1) *description and identification of species;* (2) *microscopic and gross structure;* (3) *general botany*, including *structure, development, relationship, and physiology.*

Those whose training and teaching have been in the description and identification of plants are fast passing from the field of action, and with them their unscientific methods. Such teaching can never be scientific in the high school, and for that reason the university no longer recognizes it as preparatory work. The ability to make the classification of plants a science comes after a decade of study of structure, development, and physiology, not at the very beginning of botanical study. An enthusiastic "analyzer" of plants may arouse and maintain enthusiasm in purely descriptive botany. But something more than enthusiasm is needed; pupils, might, perhaps, be kept enthusiastic in building up dissected puzzles. The "analysis" of plants may sharpen the observation and bring accuracy in the use of language; but it should be distinctly understood that, though nature study may at certain times and places be used to teach language, and though in all studies the correct use of language should be cultivated and insisted upon, yet the function of a science study is to teach science, and not language. Let us remember the highest aim of biological study — to perceive, through the object studied, relations, principles, natural law. The mere naming of plants is well enough for recreation and for pupils in the lower grades. As a diversion, the

teacher in the high school may even spend a little time at it, taking the shortest cut possible to the finding of the label. But those teachers who practice it in the high school as a study have brought the whole science of botany into contempt. For the truth of this assertion, I appeal to the knowledge and experience of everyone who understands the meaning and function of science in the high-school curriculum.

The high-school study of botany must therefore be either that on *structure* or on *general botany*, including the elements of structure, development, relationship, and physiology. A book constructed on the plan of the study of structure is Boyer's *Biology;* on general botany, Spalding's and Bergen's elementary manuals. Is there an advantage of one of these plans over the other? I believe there is a decided advantage in the latter plan. The study of structural botany alone will teach accuracy of observation and description, but very often does not promote induction by which the pupil is led to contemplate the underlying principles, which are called natural laws. It teaches the *what* preëminently well; not so well the *why*. It very often stops with a study of *things, objects*, not penetrating the object to the principles which the object illustrates.

If, on the other hand, the study emerges from *structure* into development, *relationship*, and *physiology*, the things studied become the instruments, merely, for the perception of larger truth. Here not only the *what*, but the *how* and *why*, are forced upon the pupil, and the inert plant becomes dynamic, and, therefore, tenfold more interesting. But, as was said a little while ago, whether the course is structural or broader in its range, must depend upon the ability of the teacher. Whether one method or the other is pursued, the teacher should see to it that the work does not degenerate into a study of mere things.

We cannot discuss farther the matter for a course without considering the equipment of the laboratory. What is essential as a laboratory? A well-lighted room, with work-tables; dissecting microscopes, scalpels, or small-bladed knives, and small forceps; preserved material in alcohol or formalin. These, to my mind, are altogether indispensable for every laboratory. Other tools are helpful, and good lists can be found in any recent laboratory manual. In facilities and instruments not named, with the few given above, each school must decide for itself what it can afford and what the teacher can make use of. If simple experiments are to be used to teach plant activities, there will be needed, in addition to what may be borrowed from the chemical

laboratory, a small supply of dishes and glassware. If the teacher is prepared to instruct in microscopic anatomy. and the school can afford the expense, microscopes may be provided for a large part of the work. If it is proposed to teach the subject without much microscopical work, at least a few microscopes should be provided; for certain fundamental principles cannot be comprehended by the pupil without a fairly accurate notion of cell-structure.

After all that may be said on laboratory equipment, it should be remembered that the most important instrument in any laboratory is the brain of the teacher. It is folly to provide instruments which the teacher cannot use to advantage.

Aside from the laboratory property, each pupil should own, or be provided with, an individual equipment; this will be considered further on.

There are possibly some here who wish there might be given now an outline of a proper course of study, with a naming of material and experiments. As a teacher of botany, you doubtless possess Satchell's, Spalding's, and Bergen's elementary books, and MacDougall's *Plant Physiology*. If you cannot out of these books plan a course best suited to your abilities and to your school's resources, there is no help for you. "But," you say, "these manuals contain too much for a half year's study." Of course they do; but you must have originality enough to select what you can use to best advantage. These books give the proper method. They are not intended as fetters, but as aids. You should know how to select, to reject, and to substitute material of your own for the author's prescription. If, for instance, you are using a manual which calls for acorns, and you cannot find any acorns, do not think that the completeness or success of the course is lost for want of acorns; there is not any one thing there that may not be dropped out without greatly marring the work.

A poorly managed laboratory is often a school of instruction in the art of wasting time. Whether the high-school course be altogether structural botany, or whether it be structural and physiological, the students must be held to their tasks. The work must be hard, but not irksome, requiring mental concentration and not frivolous. In no other way can it be disciplinary. Better a hundredfold spend the time on language or history or mathematics than to become slovenly or frivolous on the thin pap of diluted science. The superintendent and the principal can help in this matter. They can see whether the pupils are wasting time, whether the study is only informational, instead

of promotive of mental effectiveness and disciplinary of the reasoning powers. This is not merely the old outcry against teachers; it is a suggestion to superintendents and principals to analyze pedagogically the work of the teacher in botany, often young and inexperienced, and to help make it effective and disciplinary, by suggestions from the pedagogical side.

Turning from school principal to the teacher, it may bear repetition to say that the efficient teacher will have a clear idea of the end to be attained by the pursuit of the study, and, what is more important and more rarely found, will know the steps to the end; more, even, than this — the teacher will, at any stage in the course, be able to criticise the steps taken as true or false with respect to the path he is traveling. Above all things, let him remember that he is studying plants, not merely to know plants, but, through them, to read the workings of nature.

In order to escape the charge of being an unpractical college theorist, I wish to offer here some facts obtained from teachers of botany in high schools in this state. I have asked several of these teachers, of whose fitness to teach there is no question, whether pupils in the ninth and tenth grades can be expected so to pursue the study of botany as to use it as a means for the perception of natural relations and principles, including their own relations in nature. Without exception these teachers have replied in the affirmative, and have, moreover, stated that this aim of the study is the surest means of keeping alive the interest and the reasoning of the pupils. To give a precise illustration of the adaptation of laboratory work to the pursuit of the three aims of botany in the high school — accuracy of observation, accuracy of description, and the perception of natural relations, I will introduce here a set of review questions furnished me by a successful high-school teacher in this state, of several years' experience, who has also had an unusually broad university training. These questions are not written for this occasion, but come to me just as they were given to the pupils:

QUESTIONS FOR REVIEW II [THE LEAF].

What is a leaf? What are the parts of a typical leaf? What two principal functions do leaves perform? Is either of these functions in operation at any particular time, or under particular conditions? Name these conditions. Name the principal classes (kinds) of leaves. What is meant by venation? Explain the structure of the leaf-blade (three sets of things)? With respect to their venation name four kinds of leaves. What is a com-

pound leaf? Name and explain the two principal kinds of compound leaves. How can you tell simple opposite leaves on a little green twig from a compound leaf of similar appearance? Tell all you can about movements of leaves. Name some (three) of the principal modifications leaves may undergo. Purpose? What organs may serve as leaves when these are rudimentary or absent? Do these become leaf-like? Why? Apply this to other plant organs. Why is the leaf a thin, expanded structure? Account for the color of the upper and under surfaces. What would happen to a plant if it were stripped of its leaves? Why? What special functions may some leaves perform? Give examples. How does the leaf prepare for its fall in the autumn? What kind of a scar does it leave? How do you explain the change of colors? In what respects does the fall of the compound leaf differ from that of the simple leaf? What changes take place (*i. e.*, are externally visible) in the leaves of a plant placed in a dark-room or cellar? Why? What is the position of the leaves of a plant placed in a window? What happens if the plant be turned so that its leaves face away from the window? Explain these phenomena.

Assume, now, that we are in the laboratory to start the work; what is to be done? Each pupil will have plant-material, instruments, and tools to work with. Every pupil will have notebook, drawing-paper, a specially hard drawing pencil with needle point, etc. Do not make the mistake of allowing pupils to work with insufficient tools; do not let them think that they can work for even a day without what you regard as necessary. Either loan them what they need or excuse them from the work. Now that you have started them in the work, direct them wisely, telling them what you must, helping them to discover what they can. Avoid the use of a laboratory guide which endeavors to tell everything. Observation must be marked by originality; the descriptions must be close, in good English and complete sentences; the drawing must be accurate, and each one full of meaning. The first requisite for drawing well is a hard, sharp pencil, a pencil with needle-point. Such a point cannot be made with a knife alone; each pupil should have a plate of pumice stone or a bit of emery paper. There are conventions in drawing, even in botanical study; and the teacher should instruct his pupils in them. It is useless to say: "Draw just as it looks to you." We do not and cannot draw as objects look; we use conventions. For instance: If one is drawing cell-structure, he needs to be told that all very thin cell-membranes are to be represented by a single line, while all thick membranes are to be operated by a space between two parallel lines. Many such matters of convention must be directly taught. After assisting hundreds of stu-

dents in learning to draw in the botanical laboratory, I have come to the conclusion that continuously very poor drawing on the part of pupils is the fault of the teacher. Not that all can be taught to draw excellently; but I have yet to meet the student who cannot learn to make drawings fairly well. The teacher must show the pupils exactly the points and lines that are faulty, instead of giving general criticisms. The difference between exact portrayal and general effect must be taught. Drawings should not be made in the notebook, but upon hard, tolerably smooth-surfaced drawing-paper. The notes should recite all that the pupil works out. The boy who records his first hour's work in three sentences should either be given more to do or should receive instruction in the art of narration. During the progress of the work the teacher will take special pains, by the use of question and suggestion, to concentrate the pupil's thought, and to direct his attention to natural principles which his study illustrates.

For the experimental study of the activities of plants, the teacher will receive much aid from MacDougall's *Plant Physiology* and from Bergen's *Botany*. Some of the experiments can be performed by all the pupils individually, and some must be performed by the teacher, the pupils being required to take notes on the preparation and on the results.

Wherever possible, the laboratory period should be equal to two recitation periods. An hour is too short for the most effectual work.

What shall be said upon the relation of the laboratory to the text-book work? Let us not forget that science study is the study of things and their activities, not of books. In so far as science becomes a book study, it loses its distinctive function as a part of the curriculum. The book, therefore, should be used, not to teach science, but to summarize and extend the ideas gained in the laboratory. If you use laboratory work merely to illustrate the teachings of the book, you are in a false position, as you will learn if you take the census of opinion of the best teachers. Laboratory work first; then the text-book to summarize and supplement. Therefore, more time should be given to laboratory work than to the study of the text-book, and all recitations should at every point be connected directly with the laboratory. It is not information, but mental power that is the desideratum. If the mind is well trained, the pupil can gain outside of school and after he has left school much more information than he could ever acquire inside.

The teacher may here be warned against being turned aside from the study of general principles by outside clamor for the teaching of "practical" things. The teacher can do much to quiet this demand by taking pains to show that the best way to learn details of agriculture and horticulture is to acquire the general principles first, then to classify the details under these principles. The school does not have the time to teach the thousands of these details, but it can train the pupil so as to make him capable of acquiring them for himself.

SUMMARY.

We may conclude with the following summary:

1. The aim of botanical study in the high school is threefold: to give keenness to observation; accuracy in the use of descriptive language; to cultivate inductive reasoning, by which the mind is led to the perception of natural laws, and the pupil may recognize his relations in nature.

2. The teacher is not fitted for his work unless he himself perceives these relations, and unless he knows the path by which to conduct others to the goal.

3. The plan of the course of study must depend upon the training and ability of the teacher. It may be structural botany from a biological point of view, or it may be structural, relational, and physiological. It cannot be merely an external study leading to "analysis."

4. For laboratory work there must be a well-lighted room, fitted with tables and tools. Dissecting microscopes and a few compound microscopes are necessities, but whether there is to be a full equipment with compound microscopes will depend upon the ability of the teacher to use them to advantage.

5. The backbone of the course should be laboratory work, and the textbook an appendix to this. The laboratory work must be hard, but not irksome, and especial care must be taken to see that the study performs its disciplinary function.

F. C. NEWCOMBE

UNIVERSITY OF MICHIGAN

COMMUNICATIONS

PROFESSOR BARBOUR'S PAPER ON ENGLISH COMPOSITION IN THE HIGH SCHOOL

SINCE there was no opportunity given for the discussion of Professor Barbour's paper on "English Composition in the High School," when it was read at the state teachers' association, and since it has been given a wide circulation through the SCHOOL REVIEW, I wish to beg the indulgence of those interested in this subject, for a few moments.

Is it quite correct, pedagogically, to assume that because such geniuses as Renan, Brooks, Lowell, and the others mentioned, learned to write almost entirely without instruction, that the average high-school pupil needs little or no special instruction in English composition? If so, why not call over the roll of *uninstructed*, yet renowned mathematicians, and then conclude that we need give but little time to arithmetic and geometry? The same query might properly be made regarding great scientists, and the teaching of sciences. The fact is this: the man whose native ability and inner impulses urge him on to some great work in life, becomes his own teacher, besides making everything and everybody, his teacher as well. But the average person who is left to absorb his knowledge, or gain it in some semi-unconscious way, is quite likely to turn out an ignoramus. The English teacher could learn much more concerning his real task by studying the work of ten persons of fair ability and ordinary education, as to how they *did not* learn to write good English, than by the investigation mentioned in the paper. And these persons would not be hard to find. The teacher of English composition in the high school cares little how Shakespeares are made, but desires, rather, to learn how to give to ordinary boys and girls such a grasp of a few principles and methods of our language as will enable them to express themselves in a clear, logical, and proper manner.

The force of what the great masters say with reference to the "total culture of the mind," "commerce with the best literature," "converse with living men, face to face, and mind to mind," and all kindred thoughts is readily accepted by all English teachers. But this, though it may throw some light on the question, by no means solves the whole problem. In the face of the probable fact, that men have become great writers without a text-book or a teacher, there yet remains in the mind of the teacher a sort of instinctive notion that he has a right and a reason to exist. If this notion is not a misapprehension, then the earnest teacher of English composition would gladly know better the ground upon which he stands; on the other hand, if he has

been laboring under a delusion, and really is not needed at all, he would cheerfully be persuaded of this fact, and be allowed to "depart in peace."

But the paper goes on to say: "More and more, we believe, teachers will come to an agreement upon a few, plain, pedagogical principles." There is surely some ground for such a conviction. "'Tis a consummation devoutly to be wished." But right here the paper is disappointing, in not sounding a clearer call to a unity so greatly desired. Where shall be the rallying ground? What may those "few, pedagogical principles" be? Is there need of a class or special instruction in order to implant these principles in the mind of the common student, or may he be left to absorb them unconsciously? These are some of the fundamental questions that need to be settled before we can have a center around which to group all of the many good suggestions contained in the paper.

But instead of an answer to these questions, or a discussion of them even, which at least one earnest seeker after truth waited for, the whole subject was thrown into a "maze of doubt and uncertainty" by the statement that, "Perhaps we should gain something by declaring that English composition is best taught *by not teaching it at all*, that is by not having any distinctive course to which pupils are sent to *learn* composition." Just what that "*something*" is, to be gained from such a declaration, is also not made clear; unless it be to give to the English teacher "that tired feeling" which makes him wonder whether, after all, life is really worth living."

If in the past this subject has been poorly taught, as it unquestionably has, it is high time that we get down to the root of the matter, and, if possible, find out what those special facts and principles are, that ought and must be looked after by the teacher of composition. And we shall not sooner do this by intimations that perhaps the whole subject may best be left to take care of itself, or the other suggestion, that it be sporadicated among all the teachers, and throughout the whole course.

The criticism made in the paper upon text-books of rhetoric are well merited; and most assuredly all such books, or at least those absurd parts of them, should be discarded. But this does not prove that there can be no proper book of instruction upon this subject, no book that will appeal to good taste and sound reason. We believe that at least an approximation to such a book has been made by Professor Scott, of our state university. But if he is not on the right track, the study should be kept up until the right track is found; or until we are convinced that there is *no* right track, and that the student would best be left to be molded by merely good English influences.

That there is something special and technical for the English composition teacher in the high school to do is my firm conviction. Just *what* that *is*, it is not the purpose of this discussion to state. It would hardly be becoming in me to attempt to do so. It is for the very purpose of calling forth this important piece of wisdom from some high source that I take up this discus-

sion. It was for some such ray of light that I have read and reread the paper.

Possibly it might be answered, that one of those brilliant, new methods that "alters the style of students in a few weeks," would probably suit me. No, it would not. I should take no more stock in such an answer to the great question than does the writer of the paper himself. His comment on such methods or upon such claims for any method suits me exactly.

As to the results to be achieved, the statement of the paper is easily accepted, viz.: "Every piece of English should be characterized by clearness, unity, and effectiveness; in sentence structure, paragraph structure, and in the structure of the composition as a whole." But *how* shall this be achieved? "Aye, there's the rub." Many good suggestions are offered concerning what good birth, good literature, good conversation, good corps of teachers, etc., will do; but will all of these combined and working harmoniously together produce the high quality of English called for in the above statement? With all of these good influences playing upon him, will the average student come to write such English *unconsciously?* Not one in a thousand.

That most people *do* write altogether too *unconsciously* is readily seen from an examination of their work. Even the paper under discussion may bear some evidence on this point. On page 505 he promises "to speak of the necessity that the entire corps of teachers interest themselves in getting good English writing," but drops the thought without elaboration. Two pages farther on it is taken up in the midst of another paragraph. Again, on page 505 he brings up the topic of "the influence of good reading upon the expression of thought." But this, too, is dropped for a discussion of text-books of rhetoric. Between this discussion of bad text-books and the work which should be done by each and all of the teachers, is sandwiched in about all that is said concerning the particular and special work of the class in composition. Here is at least a suggestion that there may be such a thing as too much *unconsciousness* in writing.

Is it not possible to so train our students in the elements of English composition that they may know *how* to say what they want to say, and know *when* they have said it?

To the writer of the paper every English teacher who has read it will feel a debt of gratitude for the many excellent things contained in it. But that it is not the last word upon this very important subject is clearly evident.

C. H. HORN

TRAVERSE CITY HIGH SCHOOL
Michigan

BOOK REVIEWS

How to Study Shakespeare. By WILLIAM H. FLEMING. With an Introduction by WILLIAM J. ROLFE, LITT.D. New York: Doubleday & McClure Co., 1898.

THE place which this volume is designed to fill is doubtless well stated by Dr. Rolfe in his brief introduction, wherein it is said that "the present volume will be found helpful and suggestive" to readers not already supplied with annotated editions of the plays. Inasmuch as the text of the plays discussed is not given, readers supplied with the text may here find in small compass such aids to the understanding of the plays of Shakspere as are usually supplied in annotated editions. The plays discussed are the following: Othello, Twelfth Night, Julius Cæsar, The Merchant of Venice, Macbeth, Midsummer Night's Dream, King Richard the Third, The Tempest. In each case there is given a discussion respecting the source of the plot, the definition of difficult words, and an explanation of difficult phrases, questions on the characters, etc., with a list of collateral secondary reading, all of which seems to be, as Dr. Rolfe has said, helpful and suggestive.

The readers who will use this volume will probably not be offended by the author's consistency in spelling the name of the author of these plays uniformly as Shakespeare, but it gives an air of scholarship to quote titles of books exactly. For example, Barrett Wendell's book is entitled by himself *William Shakspere*, not *William Shakespeare*. This, however, is doubtless a matter of taste, as is also the use of the word "enthuses."

The table of acts and scenes in which each character appears, and the grouping of the minor characters so that one actor may play several parts, will be useful for reading circles.

The little volume is of convenient size and neatly bound, but pages 232 and 233 are unnecessarily disfigured by some type excessively black-faced.

RICHARD JONES

SYRACUSE UNIVERSITY

NOTES

THE DOUBLEDAY & MCCLURE COMPANY will publish immediately, under the title of *From Sea to Sea*, an authorized edition of the collected letters of travel which Mr. Rudyard Kipling has written at different times between 1890 and 1898.

Bird-Lore (The Macmillan Company) for April contains a letter from Governor Roosevelt urging the importance of protecting our birds, which shows the writer to be a genuine bird-lover and thoroughly conversant with his subject.

Physics for Beginners is the title of a work written for use in colleges and secondary schools by Henry Crew, Ph.D., professor of physics in the Northwestern University. The author's treatment differs from that in other elementary books on the same subject in that it is more consecutive. It is at every point experimental and quantitative.

TO ADD to the store of good things already contained in the Riverside Literature Series, the publishers, Messrs. Houghton, Mifflin & Co., of Boston, New York, and Chicago, have just issued as No. 130 (paper, 15 cents, *net*), *The Superlative, and Other Essays*, by Ralph Waldo Emerson. The other essays in the book are *Uses of Great Men*, *Shakespeare: or, The Poet*, *and Social Aims*. There are also notes. The book will also contain an interesting table of events, illustrating Emerson's career.

THE WESTERN ASSOCIATION OF HISTORY TEACHERS was organized at the time of the meeting of the North Central Association of Colleges and Preparatory Schools, in Chicago. A constitution was adopted, and the following officers elected: president, Professor Charles H. Haskins, University of Wisconsin; vice president, Lucy D. Wilson, Chicago High Schools; secretary and treasurer, Harry S. Vaile, Hyde Park High School. Executive Committee—Adelaide S. Baylor, Wabash High School; Earlem Dow, University of Michigan; P. V. N. Meyers, University of Cincinnati; Leona L. Thorne, J. R. Doolittle, Chicago Public Schools.

THE NORTH CENTRAL ASSOCIATION of Colleges and Preparatory Schools held an interesting meeting at the Auditorium in Chicago, March 31 and April 1. The attendance was satisfactory, and the spirit of the meeting cordial and helpful. The meeting next year will be held about the same time, in St. Louis, Mo. The following officers were elected for the ensuing year: president, W. F. Slocum of Colorado; secretary, Clarence A. Waldo of

Indiana; treasurer, George N. Carman of Illinois. Executive Committee—the president, secretary, and treasurer, ex-officio, and A. F. Nightingale of Illinois, A. S. Draper of Illinois, E. G. Cooley of Illinois, and E. W. Coy of Ohio.

MESSRS. LONGMANS, GREEN & CO. will publish, early in April, the first volume of the American Citizen Series, *Outline of Practical Sociology, with special reference to American Conditions*, by Carroll D. Wright, United States Commissioner of Labor. This series of books will treat of the practical workings of the functions of the state and of society, with especial reference to American conditions and experiences. The series will appear under the editorship of Dr. Albert Bushnell Hart, of Harvard University.

Messrs. Longmans will also publish a new book by Professor Edward Althaus, of the High Schools, Borough of Bronx, New York City, *A Synopsis of German Grammar. For the use of High Schools and Academies.*

NATURE-STUDY has not yet found its exact place in school work, or, for that matter, in social influence. Very interesting and important work in this field is being done in New York by the College of Agriculture of Cornell University. Over twenty thousand teachers, more than two thirds of the entire number in the state, have requested the *Teacher's Leaflets* of which thirteen numbers have been issued, for use in their school work. More than sixteen thousand children in the state have asked for instruction on the making of gardens, and their letters have been answered. The general purpose of the work is to educate the pupil natureward and to inculcate a love of country life. The work has been pushed and energized by means of large and personal correspondence. During the coming summer a school of nature study is announced, beginning July 5, and lasting six weeks, with free tuition to residents of the state. Among the courses offered is laboratory work in methods of nature-study with insects, made available for secondary schools, by Assistant Professor Anna B. Comstock, who is the first woman appointed to a professorship in Cornell University. Mrs. Comstock has already done important and successful work in presenting the subject of nature-study to teachers' institutes in New York State. Those who are interested in nature-study will do well to inform themselves about the work that is being done by the College of Agriculture at Cornell.

ROBERT HERBERT QUICK has an honored place among those who have encouraged and inspired teachers and helped to raise and dignify their aims during the last quarter of a century. Mr. Quick gave the introductory lecture on education in the University of Cambridge on October 18, 1879, when courses of lectures on education were first begun in an English university. In that address—"The Schoolmaster, Past and Future,"—he said: "The work of the schoolmaster is, I maintain, an important work. If this is granted it will follow that any science which influences that work is an important

science. If such science exists it should be studied. If it does not yet exist, but may exist, we should endeavor to search it out." Words like these, spoken on a historical occasion, form a landmark in the movement for the training of teachers, and it behooves his contemporaries to show that they did not pass unheeded, and that the splendid services which he so persistently and modestly rendered to education were not unrecognized. No such step was taken at the time of his death, in 1891, but the forthcoming publication of his *Literary Remains* by the Cambridge University Press, furnishes a suitable opportunity for raising some memorial. It is proposed that this memorial shall take the form of the establishment of a Quick Memorial Library, at the Teacher's Guild. If sufficient money be subscribed, the whole sum is to be invested, and the interest only devoted to the purchase of books, so that, if possible, the memorial may be permanent. Mr. Quick was well known in the United States, and several American educators have joined in the movement to raise funds for this memorial. Subscriptions, marked on envelope, "Quick Memorial Fund," may be sent either to John Russell, Cripplegate, Woking, Surrey (Hon. Librarian, Teachers' Guild); or to Professor Foster Watson, University College of Wales, Aberystwyth.

DR. MACKENZIE RESIGNS FROM LAWRENCEVILLE. — The friends of secondary education throughout the land will be surprised to learn that the the Rev. Dr. James Cameron Mackenzie has resigned the head mastership of the Lawrenceville School — John C. Green foundation — which he has held with such signal success for seventeen years, or ever since the school was organized on the basis of the munificent endowment provided by the Green family. This action, to go into effect at the end of the present academic year, has been decided on by Dr. Mackenzie, after long consideration, purely out of regard for his personal interests of health. Seventeen years of such arduous work as has been involved in the creation and conduct of Lawrenceville School, are sufficient to tax the energies of any man, however robust, and though Dr. Mackenzie, despite his long service, is still a young man, he feels the urgent need of a period of complete rest, in order to conserve his physical and mental energies and give him a fair chance for many years of labor after he shall have passed the turning point of middle life.

The trustees of Lawrenceville School have accepted his resignation in the following resolutions, which will be seen to contain a noteworthy tribute to the retiring head master, and a most substantial token of the esteem in which he is held, and the value that is placed upon his services:

"The trustees of the Lawrenceville School, having been advised by the head master, the Rev. James Cameron Mackenzie, Ph.D., of his purpose to retire from the head mastership of the school at the close of the current academic year, unanimously direct that the following minute be placed on their record, and that a copy be transmitted to the head master.

"The trustees of the Lawrenceville School, appreciating the reasons

which impel the head master to lay aside the responsible and difficult office he has filled ever since the organization of the school on the John C. Green foundation, beg to assure him of their high regard for his long, faithful, self-denying, arduous and highly successful labors in the head mastership. To him, in a very high degree, are due the organization, development, and success of the Lawrenceville School.

"It is therefore with no ordinary regret that the trustees accept his resignation, which thus brings to a conclusion his long and valuable term of service. As he withdraws to a well-earned, though temporary, rest, before entering another field of labor, the trustees follow him with their best wishes, and assure him that his great services to Lawrenceville will not be forgotten.

"The trustees also direct that as additional compensation for his services the sum of $10,000 be paid to the head master, and, furthermore, as a mark of their appreciation, they request Dr. Mackenzie to permit the Board of Trustees to place in the Memorial Hall of the school the portrait of its first head master."

FROM SUPERINTENDENT BALLIET, of Springfield, Mass., we have a right to expect something more than the routine school report. In his report of 1898 this expectation is fully met. As a frontispiece the report presents a fine engraving of the new Central High School, of which the city may well be proud. Some of the notable points in the report are the following: "The year just closing has witnessed the establishment of an independent manual training high school." The history of the movement leading to this result is sketched. The superintendent then goes on to say: "It seems to me the time has come when the next step in advance can be taken with advantage, and specific instruction in trades be added to our general courses in manual training." An admirable brief in favor of this thesis is presented. A special feature of the report is a careful discussion of the cost of the schools, which shows that the salaries are the chief item, that they are not larger than they ought to be, and that the best teachers cannot be obtained at low salaries. "The fact that teachers have been appointed solely on merit, and not through personal influence, or because they were local residents, has contributed largely to the efficiency and success of our schools, for a good many years. It has made our city a desirable place for good teachers to come to, and it has developed a high moral tone in our entire teaching corps which is not found in cities where the teachers' positions are treated as patronage to be given to the local applicants who have influential friends. In business, any investment, however small, is costly if it brings no returns, and no investment, however large, is extravagant if it brings large returns. Judged from this standard, are the schools too costly? Commissioner W. T. Harris, a few years ago, published statistics which go to show that the greater length of the schooling period in Massachusetts, as compared with that of the rest of the United States, taken as a whole, corresponds with striking exactness with

the greater earning power, per capita, of the population of Massachusetts as compared with the population of the country at large." The question of overwork in the schools also receives scientific treatment. The superintendent, in February 1898, sent out a series of printed questions, one set to be answered by the parents, another set to be answered by the pupils. The result of these replies, covering 2962 pupils, is given in a very interesting table. The average time of study at home runs from five minutes to three hours a day, the largest single number averaging thirty minutes a day. Those who do not study at home number only 272 out of 2962. The average number of minutes per day devoted to study out of school hours, varies from 29 to 63 in the different grades, the highest number being in the ninth grade. The number of reported injurious effects on health is only 56. The number of children who could do more home work is 1543; the number reported in delicate health, 338. The above answers are by parents. Of the pupils, 1540 think they could do more home work without getting tired; 840 are made tired by home study.

THE ANNUAL REPORT of Superintendent Skinner which has recently appeared, contains a large amount of matter of importance to a circle wider than is included in the State of New York, great as that state is. Few subjects of contemporary interest in education will be found missing. The codification of the educational statutes of the state has been completed and presented to the legislature. The adoption of this code is strongly urged by Dr. Skinner. "The laws relating to this subject," he says, "are practically the only ones of general public interest that remain uncodified, and they are at present the most complicated and contradictory body of laws upon the statute books." The question of the "Dual system" is next discussed. For those who are not familiar with New York institutions it may be said that the regents of the University of the State of New York distribute public money to academies, charter all secondary, higher and professional schools, and have charge of the state library and museum, while the Department of Public Instruction has charge of all schools below the high schools, of teachers' training classes and normal schools — hence the "Dual system." Each department is absolutely independent of the other, but the functions of the two departments overlap and interfere at more than one point, particularly in those high schools that have teachers' training classes connected with them. The regents are willing to absorb the Department of Public Instruction, and the Department of Public Instruction might be induced to absorb the regents. There seems to be substantial unanimity of opinion that one head is enough, but the unanswered question is which head shall be amputated? To many it will seem that there is much good somewhere in an arrangement which gives to a state two such men as Secretary Dewey and Superintendent Skinner. Superintendent Skinner does not propose to amputate either head, but to resurvey the boundaries, so that each tenant may keep in his own lot. For

high schools he has a good word: "The high school is a recognized and indispensable adjunct to our public-school system . . . . It is a great mistake to consider the high schools as in any sense apart from the public-school system. They are not to be considered as connecting links to higher institutions of learning, or as verandas about the main structure . . . . In a sense high schools are the most democratic of all our schools." An investigation was made into the subject of teaching Latin and German in the grammar grades, and the arguments pro and con are presented. The conclusion is that such a step is impracticable at present, as a general measure, though under special and favorable circumstances the plan may well be adopted.

Since the passage of the law in 1888, authorizing the state superintendent to issue certificates to graduates of colleges who have had three years' successful experience in teaching since graduation, nearly 600 college graduate certificates have been issued. These certificates are issued only upon evidence of good character and ability as teachers.

In regard to the Compulsory Education Law: "Compulsary education in this state is no longer a mere pretence, but an accomplished fact. The people are earnestly coöperating with the state and local school authorities in securing constantly improving results. In 1894, the year before the present law became operative, the percentage of daily average attendance to total enrollment was 64. In 1898, it was nearly 71. But mere statistics as to school attendance do not tell the whole story of the good accomplished by the consistent enforcement of this law. Children are absent from the school and the law impels an investigation. In many cases it is found that lack of suitable clothing or oftentimes actual hunger is the cause of detention. Private or public charity is invoked and thousands of cases of want and suffering are alleviated which would have escaped notice save for the visit of the attendance officer." A very interesting section of the report is that relating to the monument to Dr. Sheldon. On Arbor Day, May 6, penny and nickel collections were taken in the schools of the state, and a fund of about $3400 was thus obtained, sufficient to erect a bronze statue, life size, in the the western staircase of the capital. But as to this method of raising money the superintendent says. "The experience gained in this movement led all connected with it to believe that the method employed in raising the fund was open to serious objection. This was discovered too late to withdraw the proposition. It was generally conceded that the schools ought not to be used as agencies in the collection of funds for any purpose." A large number of schemes proposing to raise money in the schools for various purposes, more or less worthy, have been presented, all of which the superintendent has been unable to improve. "The 'Education Law' now before the legislature contains a provision inserted upon my recommendation, forbidding use of the school organization for the collection of funds for any purpose from children in the public schools. It would be well to extend this prohibition to all private schools if this can be reached by the law."

NEW PUBLICATIONS

EDUCATION AND PSYCHOLOGY

Heath's Pedagogical Library. The Herbartian Psychology Applied to Education. By John Adams, M.A., B.Sc., Fellow of the College of Preceptors, London; President of the Educational Institution of Scotland; Rector of the Free Church Training College, Aberdeen, Scotland. Size 5 x 7⅜ in.; pp. 284. D. C. Heath & Co.

Through Boyhood to Manhood: A Plea for Ideals. By Ennis Richmond, author of "Boyhood: A Plea for Continuity in Education." Size 5 x 7½ in.; pp. 194. Longmans, Green & Co.

A Manual of the Art of Questioning for Training Classes. Compiled from various works, and especially from those of Joseph Landon, F.G.S., author of "School Management." Size 4¾ x 7 in.; pp. 92. Price 50 cents. C. W. Bardeen, Syracuse, N. Y.

The International Education Series. Letters to a Mother on the Philosophy of Froebel. By Susan E. Blow, author of Symbolic Education. Mottoes and Commentaries of Froebel's Mother Play, etc. Size 5 x 7¼ in.; pp. xviii + 311. D. Appleton & Co.

ENGLISH LANGUAGE AND LITERATURE

Our Feathered Friends. By Elizabeth and Joseph Grinnell. Pasteboard cover. Size 5 x 7¼ in.; pp. vi + 144. D. C. Heath & Co.

Lessons for Beginners in Reading. By Florence Bass. Size 5 x 6½ in.; pp. viii + 110. D. C. Heath & Co.

An Introduction to the Study of Literature. For the use of Secondary and Graded Schools. Edited by Edwin Herbert Lewis, Ph.D., Associate Professor in the Lewis Institute; author of "A First Book in Writing English." Size 5 x 7⅞ in.; pp. xix + 410. Price $1. The Macmillan Company, New York.

Sir Bevis: A Tale of the Fields. An Adaptation of "Wood Magic" by Richard Jeffries. Edited by Eliza Josephine Kelley. Size 5 x 7 in.; pp. 129. Price 35 cents. Ginn & Co.

Vondel's Lucifer. Translated from the Dutch by Leonard Charles Van Noppen. Illustrated by John Aarts. Size 6 x 9¼ in.; pp. 438. Price $5. Continental Publishing Company, New York.

The French Revolution and The English Poets: A Study in Historical Criticism. By Albert Elmer Hancock. Ph.D., Instructor in English at Haverford College. Size 5 x 7½ in.; pp. xvi + 197. Price $1.25. A. C. McClurg & Co., Chicago.

Four American Naval Heroes: Paul Jones, Admiral Farragut, Oliver H. Perry, Admiral Dewey. A Book for Young Americans. By Mabel Borton Beebe. With an introduction by James Baldwin. Size 5¼ x 7½ in.; pp. 254. Werner School-Book Company, New York, Chicago, Boston.

MODERN FOREIGN LANGUAGES AND LITERATURES

Nuñez's First Spanish Reader. With brief Vocabulary and Questions in English on the Text. By J. Abelardo Nuñez. Size 5 x 7¼ in.; pp. 204. Price 65 cents. D. Appleton & Co.

Nuñez's Second Spanish Reader. Pp. 258. Price 85 cents. D. Appleton & Co.

Aus Deutschen Meisterwerken: Niebelungen, Parcival, Gudrun, Tristan, und Isolde. Erzählt von Sigmon M. Stern, Director of Stern's School of Languages of New York City. Size 5 x 7½ in.; pp. xxvii + 225. Price $1.20. Henry Holt & Co., New York.

La Tulipe Noire. Par Alexandre Dumas. Abridged and edited with notes by C. Fontaine, B.L., L.D., Director of French and Spanish Instruction in the High Schools of Washington, D. C. Pasteboard cover. Pp. 216. Price 40 cents. D. C. Heath & Co.

MATHEMATICS AND SCIENCE

An Introduction to the Differential and Integral Calculus and Differential Equations. By F. Glanville Taylor, M.A., B.Sc.. Mathematical Lecturer at University College, Nottingham. Size 5 x 7½ in.; pp. xiv + 568. Price $3. Longmans, Green & Co., New York.

Harper's Scientific Memoirs. III. Röntgen Rays: Memoirs by Röntgen, Stokes, and J. J. Thomson. Translated and edited by George F. Barker, LL.D., Professor of Physics in the University of Pennsylvania. Size 5⅜ x 8¼ in.; pp. 75. Harper & Bros.

IV. The Modern Theory of Solution. Memoirs by Pfeffer, Van't Hoff, Arrhenius, and Raoult. Translated and edited by Harry C. Jones, Ph.D., Associate in Physical Chemistry in Johns Hopkins University. Pp. xi + 134.

Music and Musicians. By Albert Lavignac, Professor of Harmony in the Paris Conservatory. With 94 illustrations and 510 examples in musical notation. Translated by William Marchant. Edited, with additions on music in America, by H. E. Krehbiel. Size 5¾ x 8¾ in.; pp. viii + 504. Henry Holt & Co.

Elementary Physiology. By Benjamin Moore, M.A., Professor of Physiology in the Medical Department of Yale University. With 125 illustrations. Size 5 x 7½ in.; pp. vi + 295. Price $1.20. Longmans, Green & Co.

Algebra for Schools. By George W. Evans, Instructor in Mathematics in the English High School, Boston, Mass. Size 5 x 7½ in.; pp. iv + 433. Price $1.12. Henry Holt & Co.